FASTORA
DAS-315FA2 Disk Array

User Guide

V. 1.1b

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Version **1.1**

FCC Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which is found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

--Reorient or relocate the receiving antenna
--Increase the separation between the equipment and device
--Connect the equipment to an outlet other than the receiver
--Consult a dealer or an experienced radio/TV technician for assistance

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Chapter 1 General Information

This chapter provides general information of the FASTORA DAS-315FA2.

The following topics are covered in this chapter:

- Introduction
- Key Features & Benefits
- Unpacking Your DAS-315FA2
- Components of DAS-315FA2

1.1 Introduction

FASTORA DAS-315FA2 Series is the leading Fibre Channel-to-Serial ATA external DAS subsystem. It supports not only RAID level 0, 1, 3, 5,10, but also RAID level 6 which increases the data reliability dramatically. A compact 3U design built with 15 drive trays for 3.5" disk drive with 1" height provides a very large capacity or flexible configuration as users' demand.

The unique and excellent heat dissipation design makes the subsystem more reliable and available. An easy and user friendly GUI guides users to manage the subsystem through standard Ethernet quickly.

Throughout this manual, the **FASTORA DAS-315FA2** may be referred to as **DAS-315FA2**, or simply as **DAS**.

1.2 Key Features and Benefits

- Supports 0, 1, 3, 5, 10, 6 and JBOD, ensuring a full data protection.
- Provides 15 disk bays, fulfilling your business demand for data storage.
- Hot-swappable design guarantees nonstop operation.
- Two Fibre channels provide high-speed data transmission.
- 15 driver bays for 3.5” disk drive
- Up to 1GB cache memory
- 3U compact design for more capacity
- Cable-less design for better reliability
- Swappable design for faster and easier maintenance
- User-friendly configuration via RS-232 port or Ethernet

1.3 Unpacking Your FASTORA DAS-315FA2

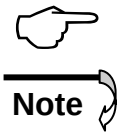
Before removing your FASTORA DAS-315FA2 from the shipping carton, you should thoroughly inspect the physical condition of the container. The package of FASTORA DAS-315FA2 should appear in good condition when you receive it. If any damaged found, do not remove the components. Contact the place of purchase for further instructions.

If the shipping container appears to be in good condition, unpack it and verify that the FASTORA DAS-315FA2 and accessories are all there and in good condition.

Your FASTORA DAS-315FA2 package should contain the following items:

Items	Quantity
FASTORA DAS-315FA2 unit	**1**
Drive Canister	**15**
Accessory Box	
Power Cord	**2**
RS-232 Cable	**1**
Spare screws	**60**
User Menu CD	**1**
Rack-mount Kit (option)	

If an item is missing or damaged, please contact the place of purchase for assistance. Retain the shipping container and packing material for reuse.



Note

Before you begin to use your FASTORA DAS-315FA2, read section 1.4 Components of the FASTORA DAS-315FA2 to learn more about the major components or your DAS system.

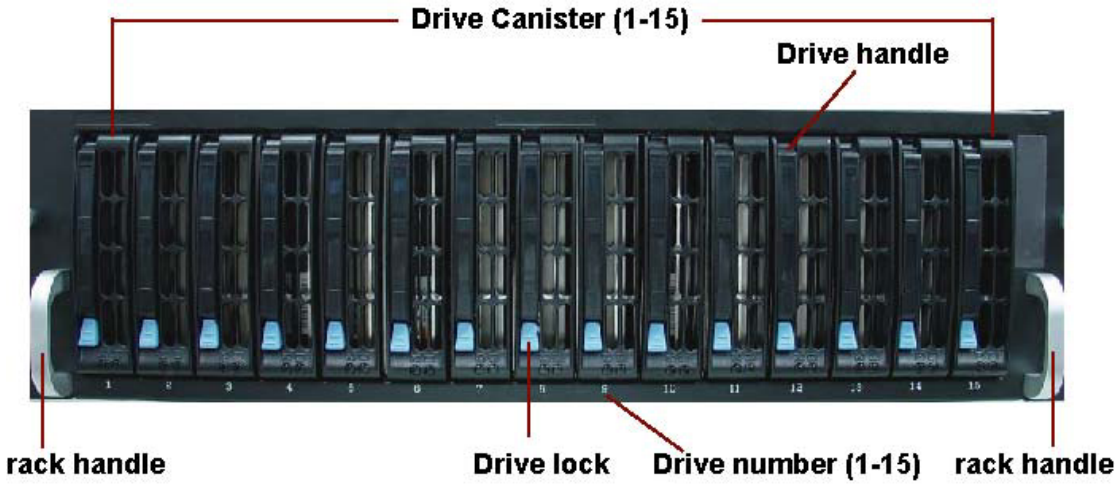
1.4 Components of the FASTORA DAS-315FA2

This section describes the major components of the FASTORA DAS-315FA2, including its front panel, LED display panel and rear panel. Read this section before you start to use your RAID DAS Subsystem.

1.4.1 The Front Panel

The front panel of FASTORA DAS-315FA2 is shown below.

Figure 1-1



For the specific detail information on each drive canister, please refer to Figure 1-2, and Table 1-1 for explanation. For LED status, please refer to Table 1-2.

Figure 1-2

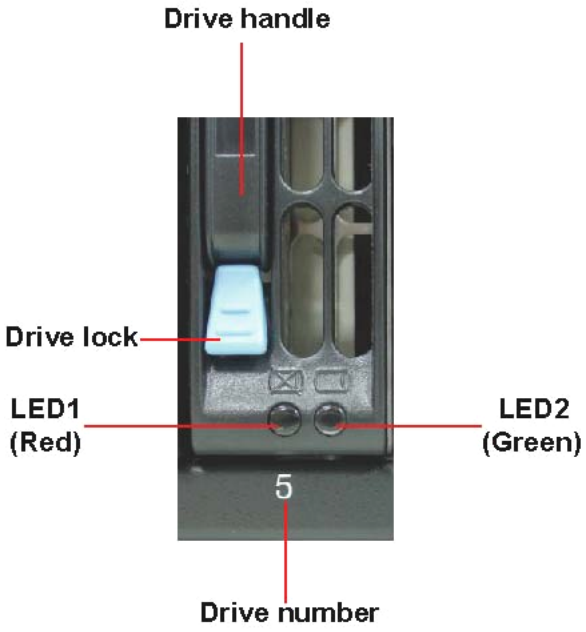


Table 1-1

Items	Descriptions
Drive handle	Used to lock and fix the drive canisters
Drive lock	Used to lock or release the drive canisters
Drive number	Used to indicate the number of each canister. (1-15)
LED1 (Red)	Used to indicate the hard drive status
LED2 (Green)	Used to indicate the hard drive status.

Table 1-2

LED Indication	Status
LED 1 (Red) continuous flash	No hard drive inserted or hard drive failed
LED 2 (Green) blinking	Hard drive access (read/write)
No flashing nor blinking on both LEDs	System standby
Both LED 1 LED 2 continuous flash	System rebuilding

Please note that DAS-315FA2 does not have a power button. When power cords are unplugged, you need to wait at least **5 seconds** so that you can power on DAS-315FA2 again. **This is designed for safe and better operation and performance, please note with extra care.**

1.4.2 The Rear Panel

The rear panel of FASTORA DAS-315FA2 is shown below. Refer to Table 1-3 for detailed description of each part on the rear panel of DAS-315FA2.

Figure 1-3

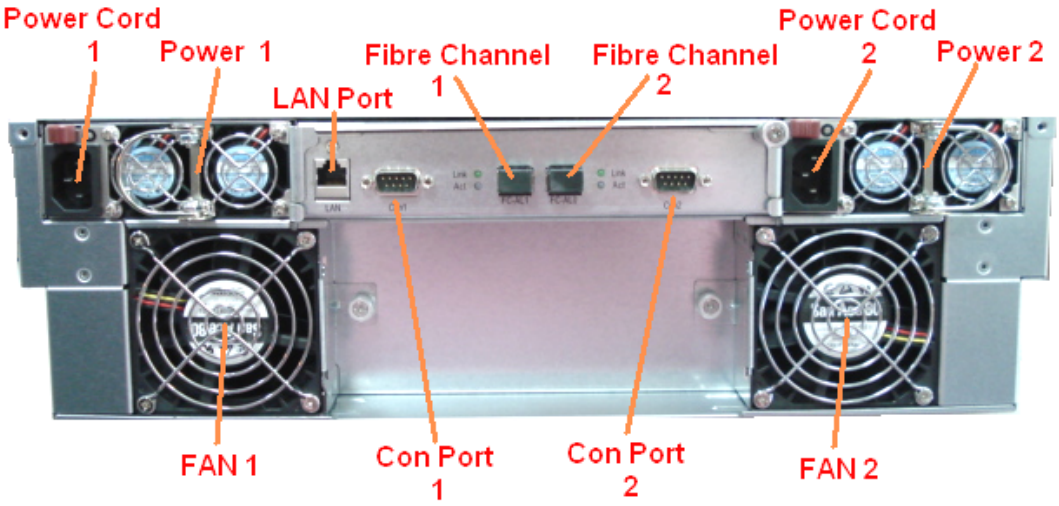


Table 1-3

Part	Description
Con Port 1	This is a RS-232 serial port, allowing you to connect to a terminal or a PC. You may configure this DAS, and upgrade the firmware and RAID.
Con Port 2 (Debug Model)	This is a RS-232 serial port, allowing you to connect to a terminal or a PC. **This port is designed for debug.**
LAN Port	Web browser RAID management through standard 10/100 Ethernet port
Fibre Channel 1	FASTORA DAS-315FA2 has two host channels, allowing you to connect to Fibre Channel devices. You may use these two channels to extend the connection to other devices.
Fibre Channel 2	
Fans	There are 2 fans located at the rear of the system unit. They are designed to provide good airflow and heat dissipation.
Power 1, 2	The DAS-315FA2 comes with 2 hot-swappable power supplies located at the rear of the subsystem. If the power supplies are in use and one fails to function, an audible alarm will warn you of the power failure.
Power Cord 1, 2	Use these power cord slots to connect power cable.

Chapter 2 Hardware Installation

This chapter discusses the basic operational installation and the Disk Drive installation.

The following topics are covered in this chapter:

- Preparing for the Installation
- Disk Drive Installation
- Table and Shelf Installation
- Rack-Mount Installation

2.1 Preparing for the Installation

If you want to connect your FASTORA DAS-315FA2 DAS to the computer using a SCSI adapter, install the adapter(s) in an available slot in the computer prior to beginning FASTORA DAS-315FA2 installation. See your operating system manuals for the configuration procedures for the host bus adapter.

2.1.1 Terminating Disk Drive Channels

All SCSI buses must be terminated at each end. Termination absorbs electrical signals and prevents those signals from bouncing back along the bus and causing interference.

The SCSI drive channels of FASTORA DAS-315FA2 have been terminated inside the chassis on the back plane. **There is no need to terminate the disk drives!**

2.1.2 Connecting FASTORA DAS-315FA2

FASTORA DAS-315FA2 can be connected to the host computer via two Fibre Channels.

2.1.3 Fibre Channel SFP Installation

First, please install SFP (Small Form Factor Plug). Push the SFP into the FC slot on the rear panel of the DAS-315FA2.

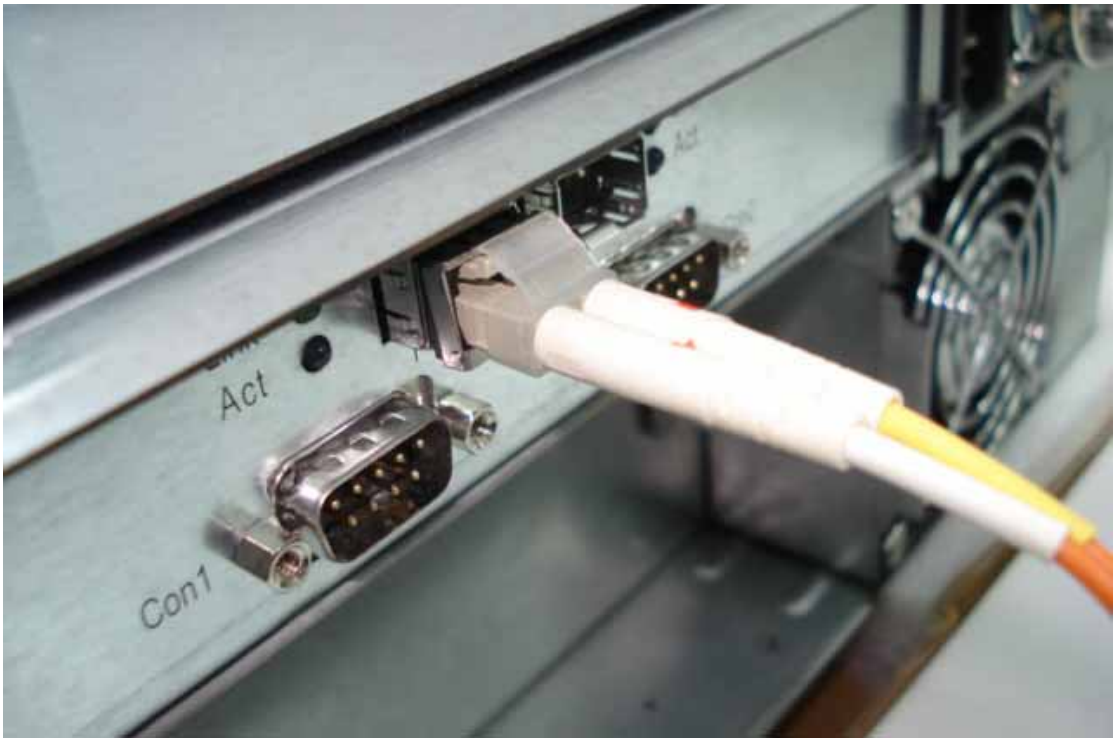
(See Figure 2-1)

Figure 2-1

2.1.4 Fibre Channel Cable Installation

Insert the Fibre Channel into one of the Fibre Channel SFP. Remember to push inward until it is firmly connected. **Please note that DAS-315FA2 supports LC cable only.**

Figure 2-2



2.1.5 Back Plane

The back plane of FASTORA DAS-315FA2 is specifically designed to furnish the stability of voltage and provide the reliability for DAS.

2.1.6 Connecting the Power Cord

Before you connect the power cords to the power supplies, make sure the power supplies have been firmly seated inside the FASTORA DAS-315FA2 DAS.

2.1.7 Uninterruptible Power Supplies

To insure the integrity of the data stored on a RAID array, we strongly recommend connecting FASTORA DAS-315FA2 to an external UPS.

2.2 Disk Drive Installation

Any 3.5“ Serial-ATA hard disk can be installed into the canister of FASTORA DAS-315FA2.

Figure 2-3 shows the disk drive and canister of DAS-315FA2.

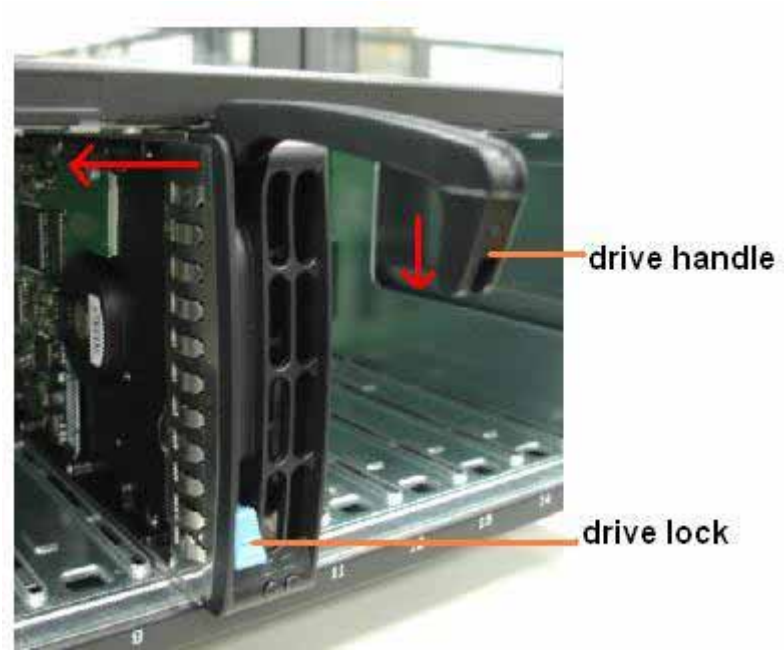
Figure 2-3 Disk Drive and Canister

Please put your hard drive into the canister, and then use four screws to fasten the drive on both sides of the canisters. (two screws on each side) **Please note that you fasten the drive at the right location.** (See Figure 2-4)

Figure 2-4

DAS-315FA2 DAS provides 15 slots that enable you to store your data. Insert each drive to the drive canister of DAS; push the canisters to the end, and then push down the drive handle until it is completely locked with the blue drive lock. System will automatically check all available disks. (See Figure 2-5).

Figure 2-5



2.3 Table and Shelf Installation

Follow these steps to install DAS-315FA2 on a table or shelf when you finish installing drives into the canisters.

Step 1 Install the drive canisters into the drive slots of DAS-315FA2.

Step 2 Place DAS-315FA2 on a table or shelf close to a power source.

Step 3 Connect DAS-315FA2 to the host computer with the RS-232 cable or Fast Ethernet cable.

Step 4 Connect the power cord to DAS-315FA2 and to the power outlet.

Step 5 Use the supplied control panel key to turn on the power.

The LED will turn on and DAS-315FA2 will begin operation. You can start to configure the DAS-315FA2 through a terminal or a web browser.

2.4 Rack-Mount Installation

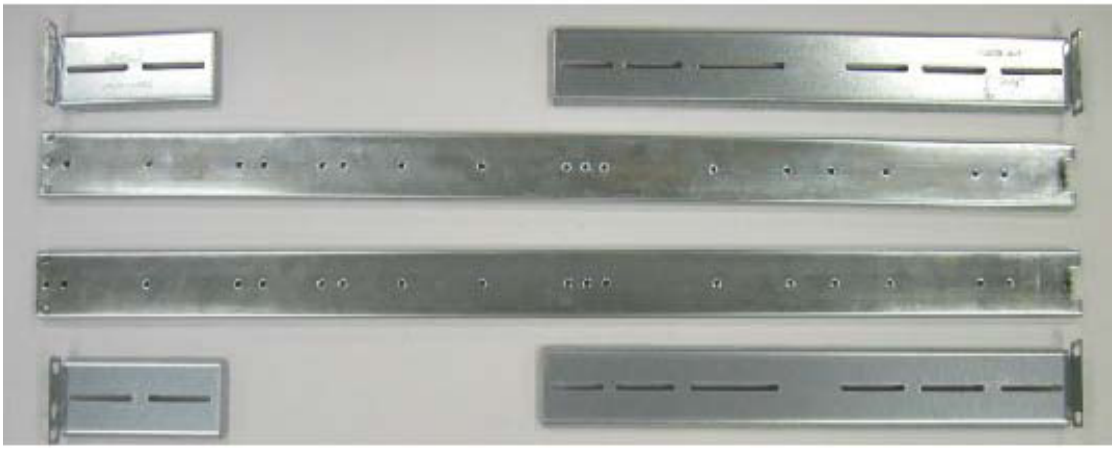
Follow the instructions in this section to properly mount your DAS-315FA2 in a rack. Before getting started, you need to prepare proper screwdrivers to perform the procedure.

Use the following procedures to install your DAS-315FA2 into a rack:

1. Unpack your DAS-315FA2 package; then remove the rack-mount kit from the package. You should find all guide rails and brackets as shown in Figure 2-6.

Figure 2-6

medium guide rails and brackets

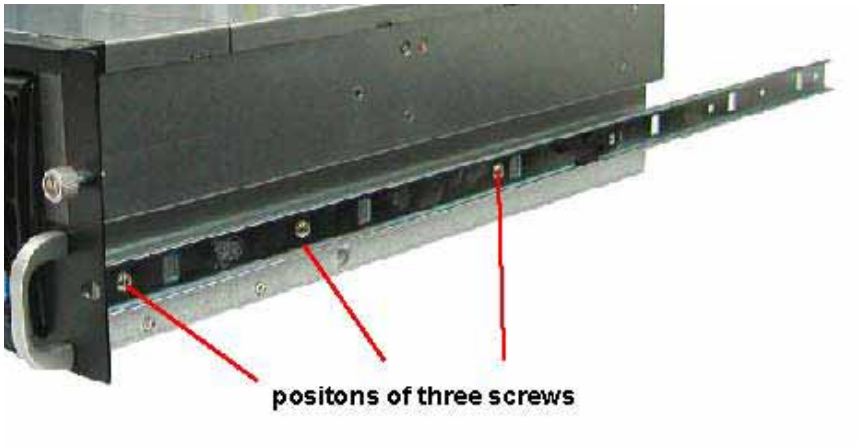


side rails

Please note that side rails are originally packed within the medium guide rails. You have to take them out first.

2. Fasten the side rails on two sides of DAS-315FA2 with the supplied screws. (See Figure 2-7)

Figure 2-7



3. Attach four supplied brackets with the screws to two medium guide rails. Secure the medium guide rails with the supplied screws to both sides of the racks. (See Figure 2-8)

Figure 2-8

4. Slightly press the black rail release latches (Figure 2-9) on both sides of DAS-315FA2 while sliding into a rack. (Figure 2-10)

Figure 2-9

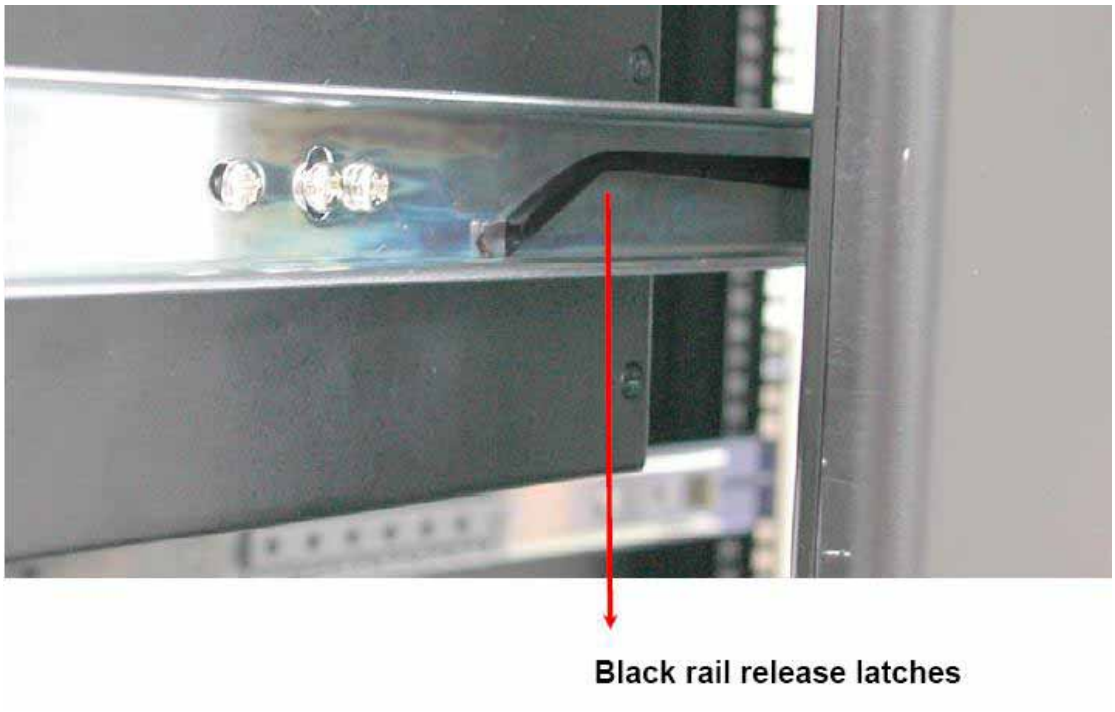
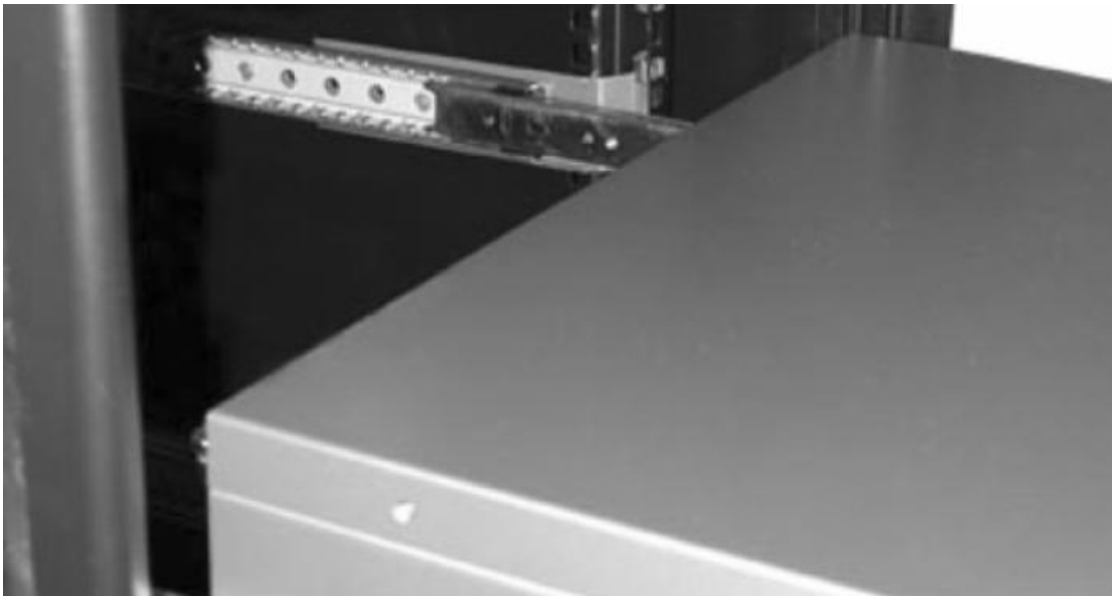


Figure 2-10



Note: To reduce the risk of personal injury or damage to the equipment, make sure **at least two people load DAS-315FA2 into the rack**.

5. Secure the DAS with the supplied screws on the faceplate.

The rack-mount installation has completed.

Chapter 3 Configuration

FASTORA DAS-315FA2 can be configured via i a terminal or a web-browser. This chapter will discuss the configuration methods and the detailed information about the operation modes.

This chapter covers the following topics:

- Configuring Through a Terminal
- Operation Modes
- Main Menu

3.1 Connect a Terminal

Located at the rear of the DAS, a RS-232 connector, marked as **Con 1** can be used to support the local terminal access. When connecting a terminal to the DAS, make sure you have attached the supplied RS-232 cable to the right connector. Note that you should set up the communication parameters before using this terminal. To start up:

1. Plug one end of the supplied RS-232 cable to the port marked as **Con 1** at the rear of the DAS.
2. Connect one end of the RS-232 cable to the COM port of your terminal or PC.
3. Run an equivalent program of the terminal.
4. Change the setting of the terminal to match the default settings of the FASTORADAS-315FA2, namely:
   - Baud rate: 115,200
   - Data bit: 8
   - Stop bit: 1

- Parity: None
- Flow Control: None

You shall see a pop-up screen indicating that the connection has been setup successfully. Then, you may configure the DAS with your terminal. Refer to section **3.3 Control Key Definition under ANSI Terminal** to learn the control keys for terminal emulation.

Please note that if you wish to start to configure with your terminal as quickly as possible, you may refer to **Section 4.1.2 Quick setup via Terminal Configuration**.

3.2. Use PC for Terminal Emulation

If you do not have a dedicated terminal, you can still use a PC configured as a terminal, running a terminal emulation program. Microsoft Windows and Windows 95 both have built-in terminal emulation support. Please select ANSI terminal as the terminal type for the terminal emulation. You can also use other terminal emulation programs such as KERMIT or VTERM. If you cannot see anything on the screen after the session has been established, press TAB key followed by X key combination to refresh the screen.

Follow the same steps discussed in section **3.1 Connect a Terminal to connect your PC to the DAS.**

3.3 Operation Modes

FASTORA DAS-315FA2 DAS has three operation modes: Self-Diagnostic Mode, Operation Mode, and Configuration Mode. We will discuss each of the RAID DAS operation modes in the following sections.

3.3.1 Self Diagnostic Mode

To ensure flawless operation, the DAS has a built-in self-diagnostic utility.

Self-diagnostics will be performed automatically upon power up of the DAS or right after you restart the unit. In this mode of operation, all components will be tested. If any problem occurred, it will report to the user.

The Self-Diagnostic mode runs three major diagnostics. The first diagnostic tests the CPU and supporting the core logic chips, internal bus, memory, SCSI controllers, and RS-232 controllers. The second diagnostic tests the presence of disks on each individual disk channel. It also checks the functionality of the disks found. The last diagnostic tests RAID functionality.

3.3.2 Operation Mode

Operation mode continuously reports the operating status of the DAS and the drives connected to it. During normal operation,

3.3.3 Configuration Mode

Configuration mode is used to modify the settings of DAS. Users can configure the FASTORA DAS-315FA2 either through the LAN port or via a terminal. Note that you are entering the configuration mode whenever you are pressing the **X** button during the Operation Mode.

1. You cannot enter the configuration Mode from Terminal at the same time.

2. You will be prompted to enter your password if the password-checking feature is enabled. Provide the correct password to continue your configuration.

Unless the DAS is running the self-diagnose mode, you may select any of the configuration modes at any time. The configuration mode of FASTORA DAS-315FA2 is completely menu-driven for the ease of use. And the menu options allow you to fine-tune DAS to your specific configuration.

3.4 Main Menu and Password

The main menu consists of the following menus: **Quick Volume/RAID Setup, Raid Set Function, Volume Set Function, Physical Drives, Raid System Function, Fibre Channel Configuration, Ethernet Configuration, View System Events, Clear Even Buffer, Hardware Monitor** and **System Information.** Please refer to Table 3-1 for the description of each menu. We will navigate the main tree in this section. Figure 3-1 shows the main menu screen when configuring through a terminal. You need to enter password for each selection. The default password is **0000**.

Figure 3-1

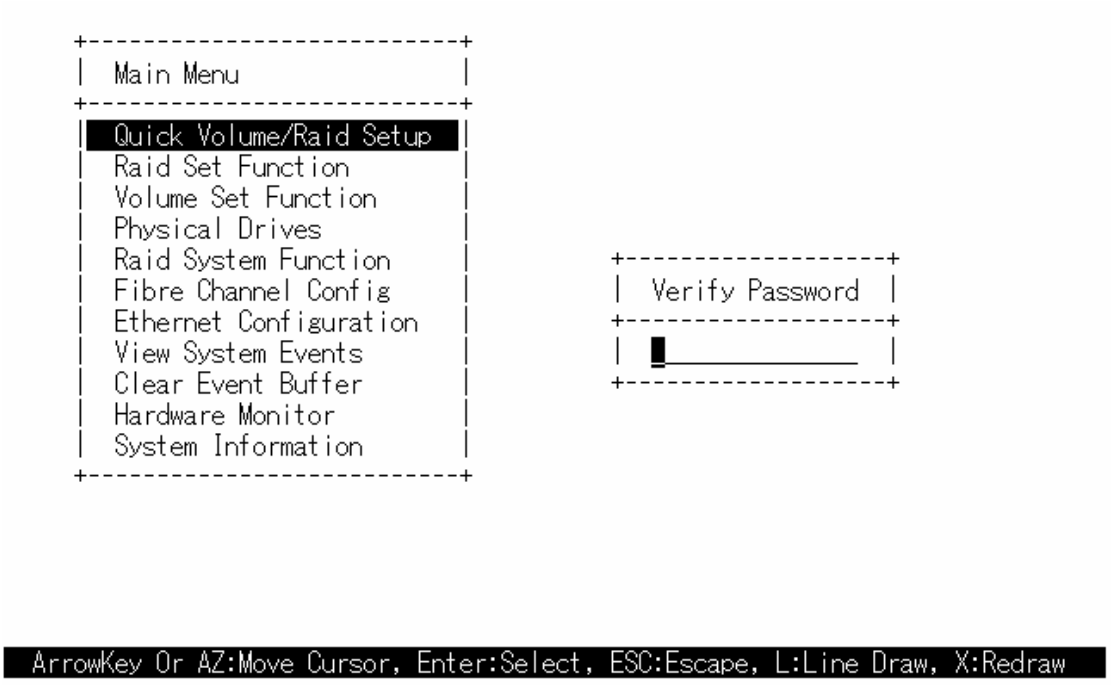
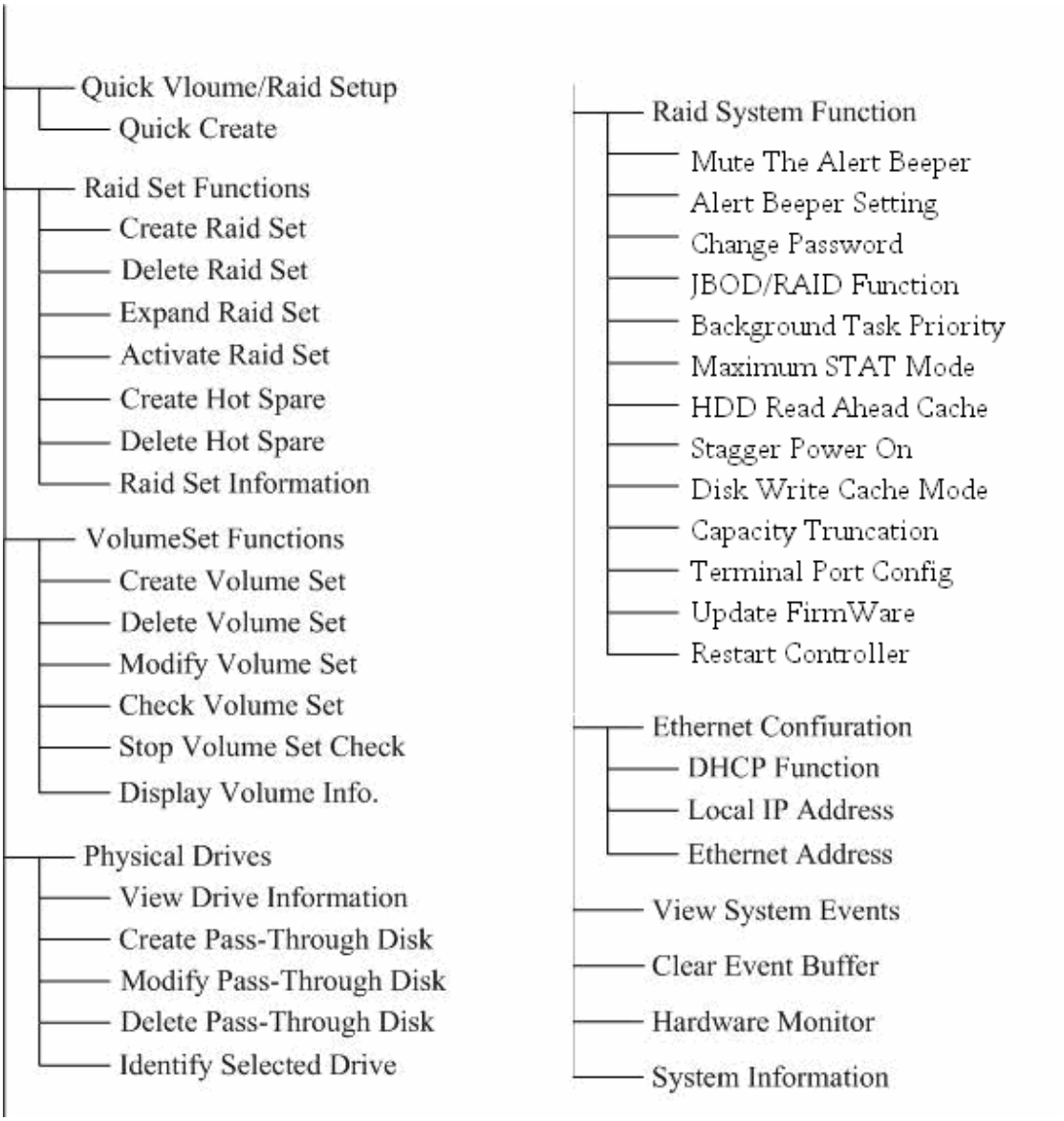


Table 3-1

Option	Description
Quick Volume And Raid Setup	Create a default configurations which are based on the number of physical disk installed
Raid Set Functions	Create a customized raid set
Volume Set Functions	Create a customized volume set
Physical Drive Functions	View individual disk information
Raid System Function	Set the raid system configurations
Fibre Channel Configuration	Set Fibre Channel configurations
Ethernet Configuration	Set Ethernet configuration
Views System Events	Record all system events in the buffer
Clear Event Buffer	Clear all event buffer information
Hardware Monitor	Show all system environment status
System Information	View the controller information

3.4.1 Hierarchical Structure of Main Menu.

This part provides a detailed structure of Main Menu. You may refer this structure to find the specific functions and configure the settings you need.



3.4.2 Terminal Configuration

The RAID subsystem configuration utility is firmware-based and uses to configure raid sets and volume sets. Because the utility resides in the RAID controller firmware, its operation is independent of the operating systems on your computer. Use this utility to:

· Create raid set,

. Expand raid set,

· Define volume set,

· Add physical drive,

· Modify volume set,

· Modify RAID level/stripe size,

. Define pass-through disk drives,

. Update firmware,

. Modify system function, and

· Designate drives as hot spares.

Configuring Raid Sets and Volume Sets

You can configure raid sets and volume sets with VT-100 terminal function using Quick Volume/Raid Setup automatically, or Raid Set/Volume Set Function manually configuration method. Each configuration method requires a different level of user input. The general flow of operations for raid set and volume set configuration is:

Step	Action
1	Designate hot spares/pass-through (optional).
2	Choose a configuration method.
3	Create raid sets using the available physical drives.
4	Define volume sets using the space in the raid set.
5	Initialize the volume sets (logical drives) and use volume sets in the host OS.

Designating Drives as Hot Spares

All unused disk drive that is not part of a raid set can be created as a Hot Spare. The Quick Volume/Raid Setup configuration will automatically add the spare disk drive with the raid level for user to select. For the Raid Set Function configuration, user can use the **Create Hot Spare** option to define the hot spare disk drive.

A Hot Spare disk drive can be created when you choose the **Create Hot Spare** option in the Raid Set Function, all unused physical devices connected to the current controller appear: Select the target disk by clicking on the appropriate check box.

Press the **Enter** key to select a disk drive, and press **Yes** in the Create Hot Spare to designate it as a hot spare.

Using Quick Volume /Raid Setup Configuration

In **Quick Volume /Raid Setup Configuration**, it collects all drives in the tray and includes them in a raid set. The raid set you create is associated with exactly one volume set, and you can modify the default RAID level, stripe size, and capacity of the volume set. Designating Drives as Hot Spares will also show in the raid level selection option. The volume set default settings will be:

Parameter	**Setting**
Volume Name	Volume Set # 00
Fibre Channel/Fibre Loop ID/SCSI LUN	0/0/0
Cache Mode	Write Back
Tag Queuing	Yes
Max Sync Rate	Depend your host adapter setting

The default setting values can be changed after configuration is complete. Follow the steps below to create arrays to set up **Quick Volume /Raid Setup** Configuration:

Step	Action
1	Choose **Quick Volume /Raid Setup** from the main menu. The available RAID levels with hot spare for the current volume set drive are displayed.
2	Try to use drives of the same capacity in a specific array. If you use drives with different capacities in an array, all the drives in the raid set is treated as though they have the capacity of the *smallest* drive in the raid set. The numbers of physical drives in a specific array determine the RAID levels that can be implemented with the array. RAID 0 requires one or more physical drives, RAID 1 requires at least 2 physical drives, RAID 1+Spare requires at least 3 physical drives, RAID 3 requires at least 3 physical drives, RAID 5 requires at least 3 physical drives. RAID 6 requires at least 4 physical drives. RAID 3 +Spare requires at least 4 physical drives, RAID 5 + Spare requires at least 4 physical drives, and RAID 6 + Spare requires at least 5 physical drives. Highlight ***RAID level*** for the volume set and press **Enter** key to confirm.
3	Set the capacity size for the current volume set. After Highlight *RAID level* and press Enter key. The selected capacity for the current volume set is displayed. Using the **UP** and **DOWN** arrow key to create the current volume set capacity size and press **Enter** key to confirm. The available stripe sizes for the current volume set are displayed.
4	Using the **UP** and **DOWN** arrow key to select the current volume set stripe size and press **Enter** key to confirm it. This parameter specifies the size of the stripes written to each disk in a RAID 0, 1(0+1), 5 or 6 Volume Set. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB. A larger stripe size provides better-read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random read requests more often, choose a small stripe size.

5	When you are finished defining the volume set, press **Enter** key to confirm the Quick Volume And Raid Set Setup function.
6	*Fast Initialization* Press **Enter** key to define fast initialization and **Esc** key to normal initialization. In the Normal Initialization, the initialization proceeds as a background task, the volume set is fully accessible for system reads and writes. The operating system can instantly access to the newly created arrays without requiring a reboot and waiting the initialization complete. In Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
7	Initialize the volume set you have just configured.
8	If you need to add additional volume set, using main menu *Create Volume Set* function.

Using Raid Set/Volume Set Function Method

In Raid Set Function, you can use the **Create Raid Set** function to generate the new raid set. In Volume Set Function, you can use the **Create Volume Set** function to generate its associated volume set and parameters.

If the current controller has unused physical devices connected, you can choose the Create Hot Spare option in the Raid Set Function to define a global hot spare. Select this method to configure new raid sets and volume sets. The **Raid Set/Volume Set Function** configuration option allows you to associate volume set with partial and full raid set.

Step	Action
1	To setup the Hot Spare (option), choose ***Raid Set Function*** from the main menu. Select the **Create Hot Spare** and press **Enter** key to set the Hot Spare.
2	Choose ***Raid Set Function*** from the main menu. Select the **Create Raid Set** and press **Enter** key.
3	A Select SATA Drive For Raid Set window is displayed showing the SATA drive connected to the current controller.
4	Press the **UP** and **DOWN** arrow keys to select specific physical drives. Press the **Enter** key to associate the selected physical drive with the current raid set.

	Try to use drives of the same capacity in a specific raid set. If you use drives with different capacities in an array, all the drives in the array is treated as though they have the capacity of the smallest drive in the array. The numbers of physical drives in a specific raid set determine the RAID levels that can be implemented with the raid set. RAID 0 requires one or more physical drives per raid set. RAID 1(0+1) requires at least 2 physical drives per raid set. RAID 3 requires at least 3 physical drives per raid set. RAID 5 requires at least 3 physical drives per raid set. RAID 6 requires at least 4 physical drives per raid set
6	An Edit The Raid Set Name dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #. Press **Enter** to finish the name editing.
5	After adding physical drives to the current raid set as desired, press **Yes** to confirm the Create Raid Set function.
6	An Edit The Raid Set Name dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #.
7	Press **Enter** key when you are finished creating the current raid set. To continue defining another raid set, repeat step 3. To begin volume set configuration, go to step 8.
8	Choose **Volume Set Function** from the Main menu. Select the **Create Volume Set** and press **Enter** key.
9	Choose one raid set from the Create Volume From Raid Set window. Press **Enter** key to confirm it.
10	The Volume Creation screen shows the volume set default attribute values that are currently being configured. The attribute column headings are: The Raid Level, The Stripe Size, The Fibre HOST/Fibre Loop ID/LUN/, The Cache Mode,

	The Tagged Queuing, The SCSI Max Rate, and The Volume Name (number). The user can change all values After the current volume set attributes are defined, press **Esc** key to enter Initialization selection screen..
11	*Fast Initialization* Press **Enter** key to define fast initialization and **Esc** key to normal initialization. In the Normal Initialization, the initialization proceeds as a background task, the volume set is fully accessible for system reads and writes. The operating system can instantly access to the newly created arrays without requiring a reboot and waiting the initialization complete. In Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
12	If space remains in the raid set, the next volume set can be configured. Repeat steps 8 to 11 to configure another volume set.

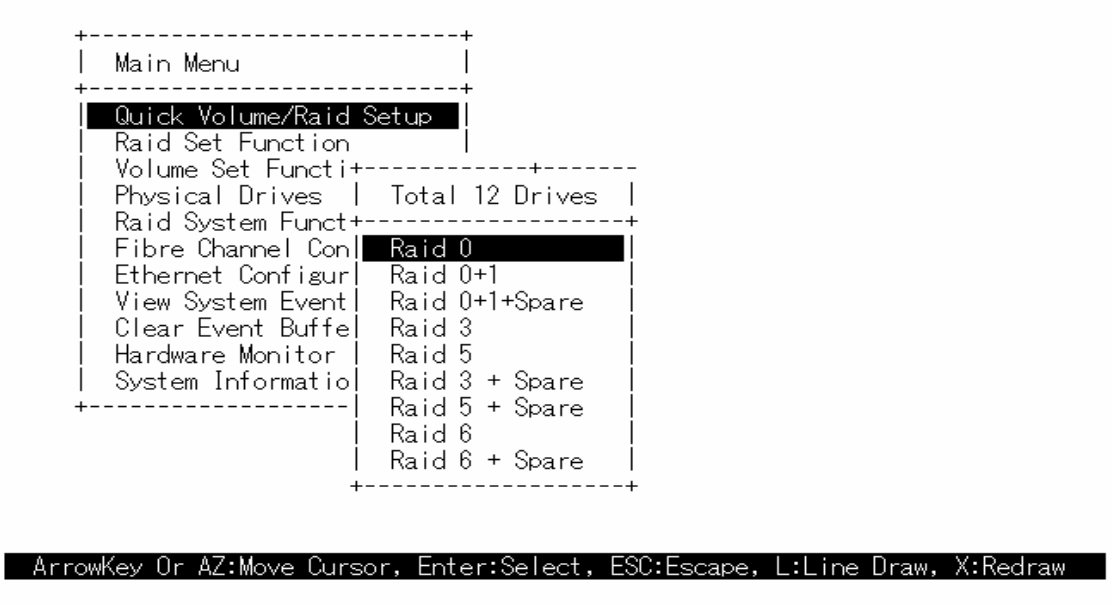
Note: User can use this method to examine the existing configuration. Modify volume set configuration method provides the same functions as create volume set configuration method. In volume set function, you can use the modify volume set function to modify the volume set parameters except the capacity size:

Quick Volume/Raid Setup

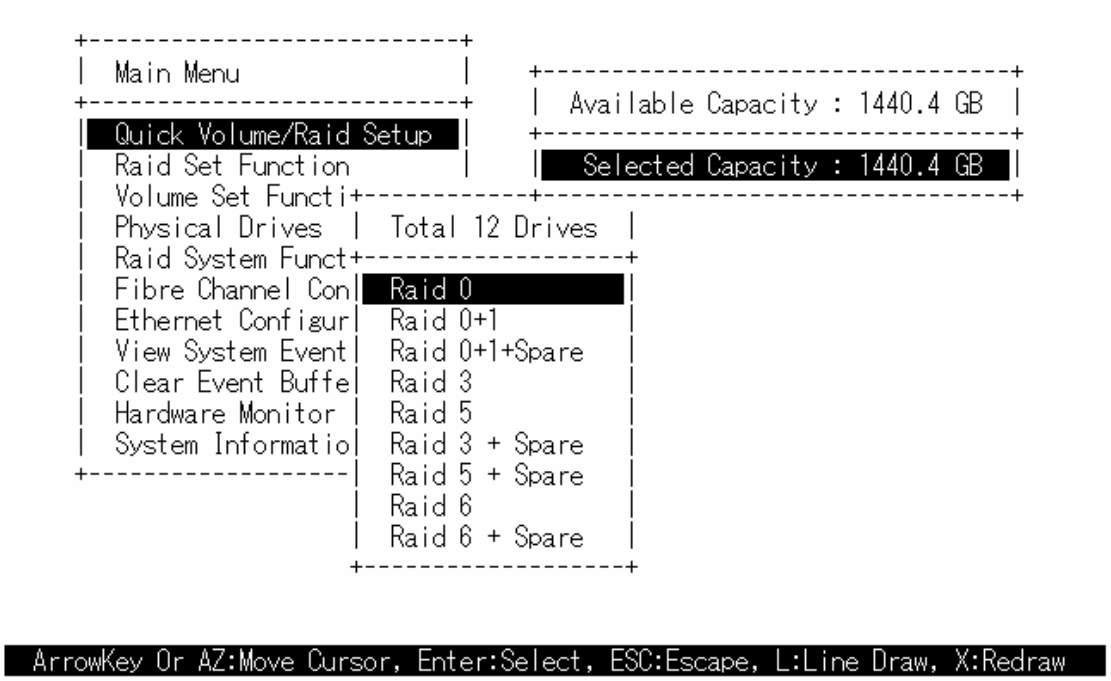
Quick Volume/Raid Setup is the fastest way to prepare a raid set and volume set. It only needs a few keystrokes to complete it. Although disk drives of different capacity may be used in the raid set, it will use the smallest capacity of the disk drive as the capacity of all disk drives in the raid set. The Quick Volume/Raid Setup option creates a raid set with the following properties:

1. All of the physical disk drives are contained in a raid set.
2. The raid levels associated with hot spare, capacity, and stripe size are selected during the configuration process.
3. A single volume set is created and consumed all or a portion of the disk capacity available in this raid set.
4. If you need to add additional volume set, using main menu Create Volume Set function

The total physical drives in a specific raid set determine the RAID levels that can be implemented with the raid set. Press the **Quick Volume/Raid Setup** from the main menu; all possible RAID levels screen will be displayed.

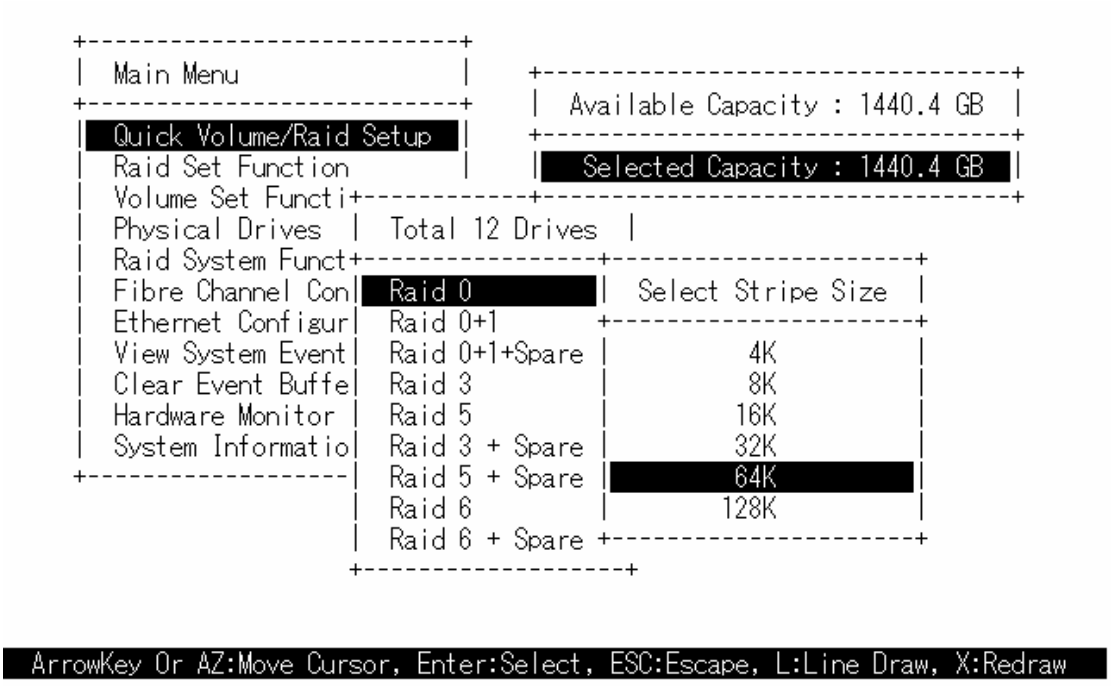


A single volume set is created and consumed all or a portion of the disk capacity available in this raid set. Define the capacity of volume set in the Available Capacity popup. The default value for the volume set is displayed in the selected capacity. Use the Arrow key to modify volume set capacity and press the **Enter** key to accept this value. If it only use part of the raid set capacity, you can use the **Create Volume Set** option to define another volume sets



Stripe size This parameter sets the size of the stripe written to each disk in a RAID 0, 1(0+1), 5, or 6 logical drive. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB.

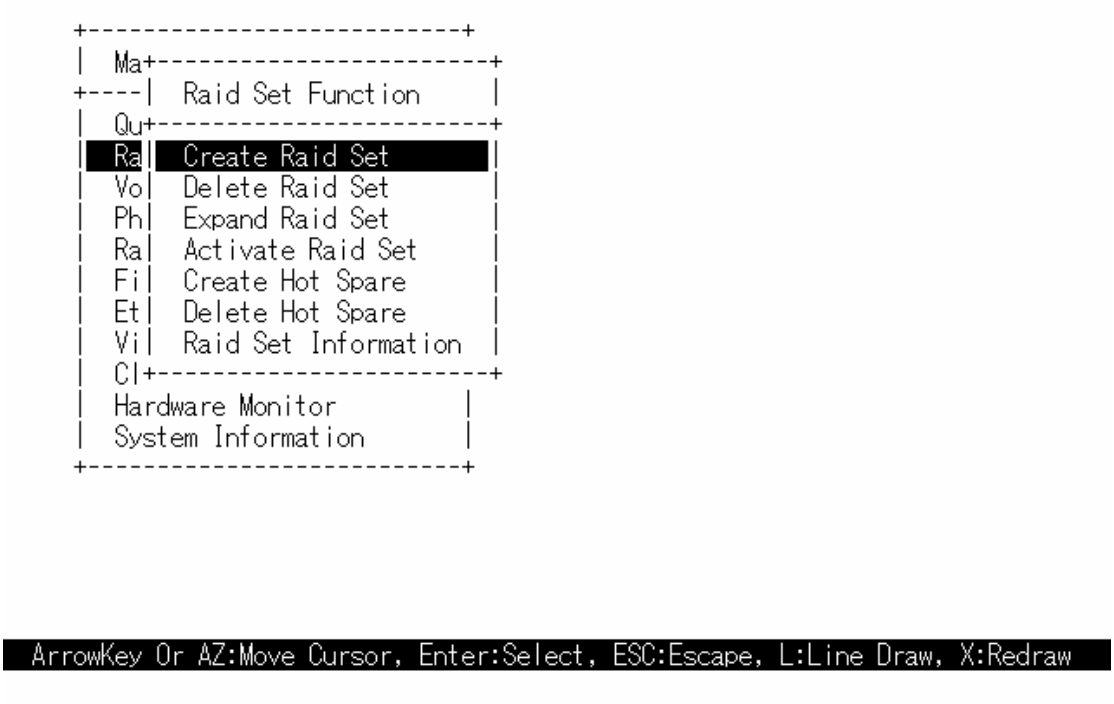
A larger stripe size produces better-read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random reads more often, select a small stripe size.



Press the **Yes** key in the Create Vol/Raid Set dialog box, the raid set and volume set will start to initialize it.

Raid Set Function

User manual configuration can complete control of the raid set setting, but it will take longer to complete than the Quick Volume/Raid Setup configuration. Select the Raid Set Function to manually configure the raid set for the first time or deletes existing raid set and reconfigures the raid set.

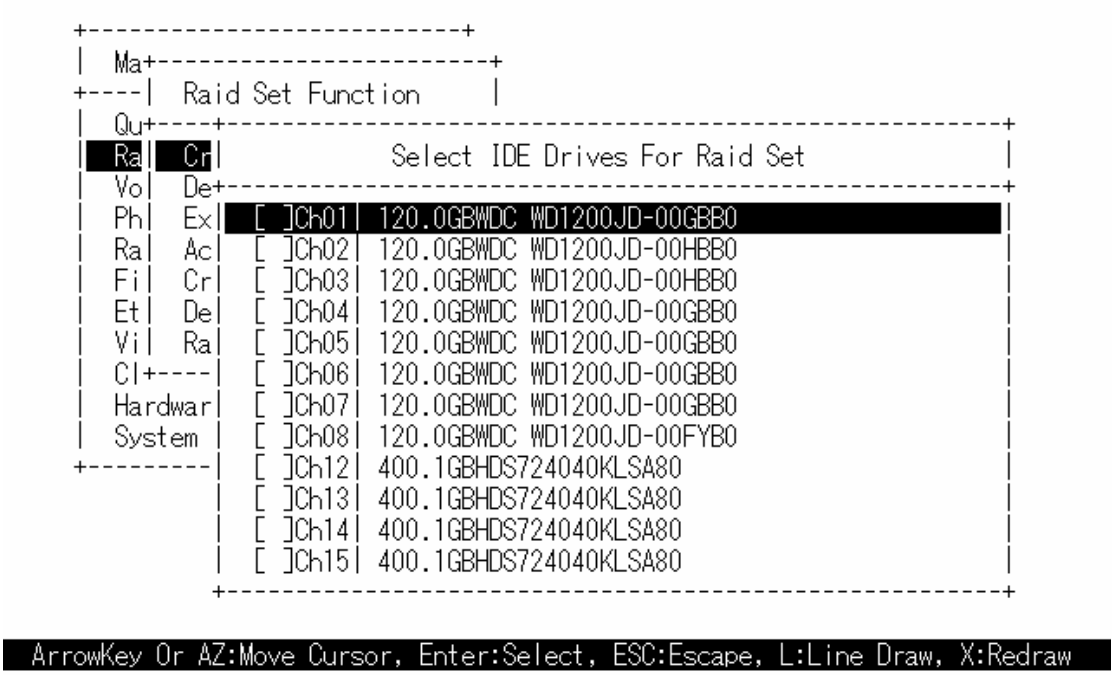


Create Raid Set

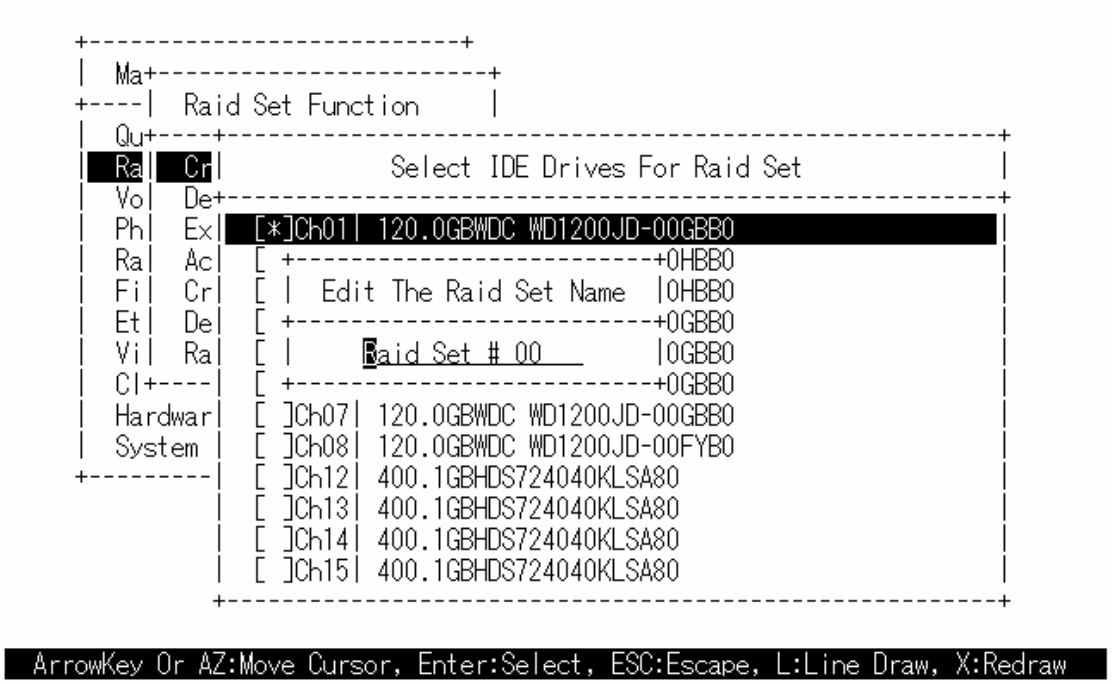
To define raid set, follow the procedure below:

1. Select **Raid Set Function** from the main menu.
2. Select **Create Raid Set** option from the **Raid Set Function** dialog box.
3. A **Select SATA Drive For Raid Set** window is displayed showing the SATA drive connected to the current controller. Press the **UP** and **DOWN** arrow keys to select specific physical drives. Press the **Enter** key to associate the selected physical drive with the current raid set. Repeat this step, as many disk drives as user want to add in a single raid set.

To finish selecting SATA drives For Raid Set, press **Esc** key. A **Create Raid Set confirmation** screen appears, Press **Yes** key to confirm it.

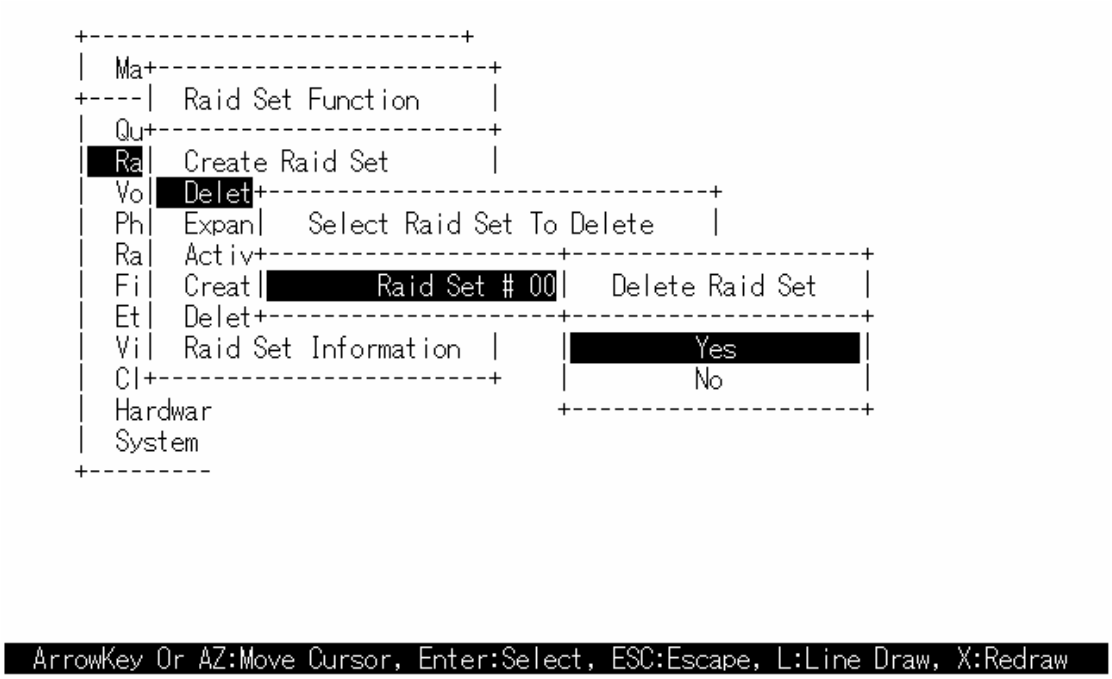

Raid Set Function
Select IDE Drives For Raid Set
[ ]Ch01 120.0GBWDC WD1200JD-00GBB0
[ ]Ch02 120.0GBWDC WD1200JD-00HBB0
[ ]Ch03 120.0GBWDC WD1200JD-00HBB0
[ ]Ch04 120.0GBWDC WD1200JD-00GBB0
[ ]Ch05 120.0GBWDC WD1200JD-00GBB0
[ ]Ch06 120.0GBWDC WD1200JD-00GBB0
[ ]Ch07 120.0GBWDC WD1200JD-00GBB0
[ ]Ch08 120.0GBWDC WD1200JD-00FYB0
[ ]Ch12 400.1GBHDS724040KLSA80
[ ]Ch13 400.1GBHDS724040KLSA80
[ ]Ch14 400.1GBHDS724040KLSA80
[ ]Ch15 400.1GBHDS724040KLSA80
ArrowKey Or AZ:Move Cursor, Enter:Select, ESC:Escape, L:Line Draw, X:Redraw

4. An **Edit The Raid Set Name** dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #. Press **Yes** in the following screen to finish.


Raid Set Function
Select IDE Drives For Raid Set
[*]Ch01 120.0GBWDC WD1200JD-00GBB0
Edit The Raid Set Name
Raid Set # 00
[ ]Ch07 120.0GBWDC WD1200JD-00GBB0
[ ]Ch08 120.0GBWDC WD1200JD-00FYB0
[ ]Ch12 400.1GBHDS724040KLSA80
[ ]Ch13 400.1GBHDS724040KLSA80
[ ]Ch14 400.1GBHDS724040KLSA80
[ ]Ch15 400.1GBHDS724040KLSA80
ArrowKey Or AZ:Move Cursor, Enter:Select, ESC:Escape, L:Line Draw, X:Redraw

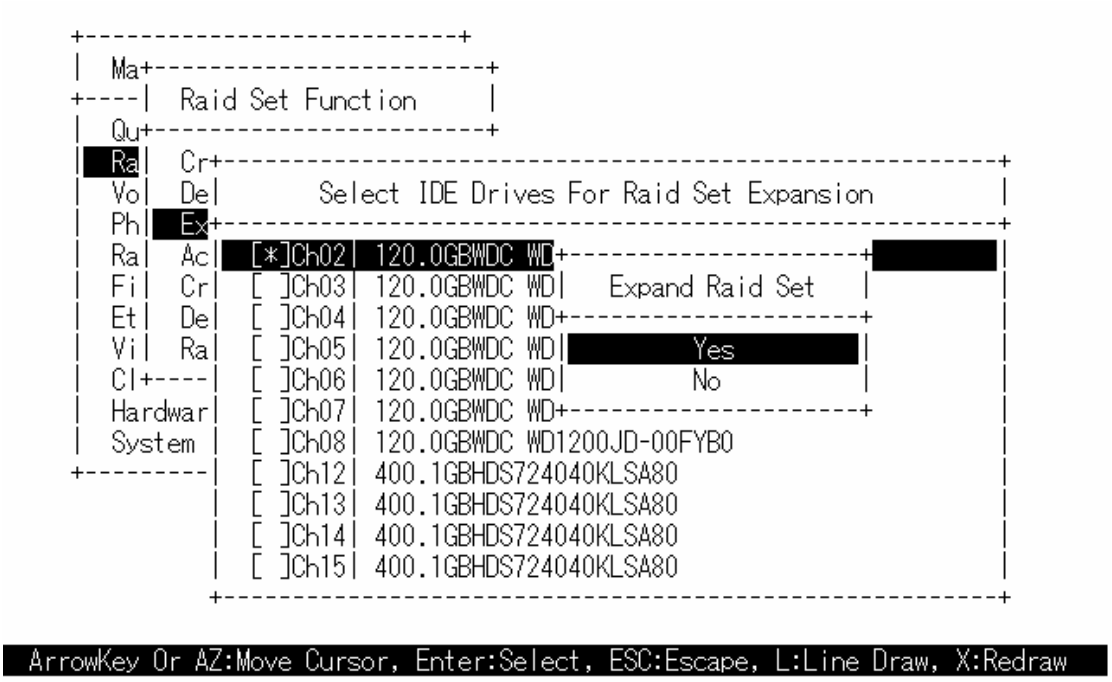
Delete Raid Set

To change a raid set, you should first delete it and recreate the raid set. To delete a raid set, select the raid set number that user want to delete in the **Select Raid Set to Delete** screen. The **Delete Raid Set** dialog box appears, then press **Yes** key to delete it. The double confirmation screen appears, then press **Yes** key to make sure of the function.



Expand Raid Set

Instead of deleting a raid set and recreating it with additional disk drives, the Expand Raid Set function allows the users to add disk drive to the raid set that was created.



To expand a raid set, follow the procedure below:

1. Click **Expand Raid Set** option. If there is an available disk, then the Select SATA Drives For Raid Set Expansion screen appears.
2. Select the target Raid Set by clicking on the appropriate radial button. Select the target disk by clicking on the appropriate check box.
3. The double confirmation screen appears. Press **Yes** key to start the function.

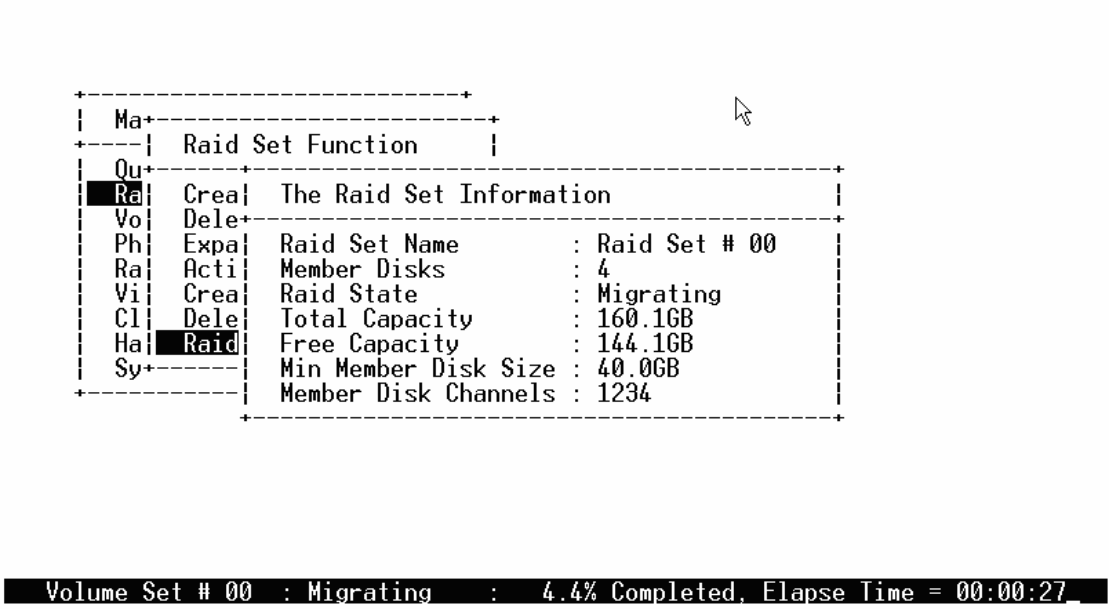
The new add capacity will be define one or more volume sets. Follow the instruction presented in the Volume Set Function to create the volume set s.

Note:

1. Once the Expand Raid Set process has started, user cannot stop it. The process must be completed.
2. If a disk drive fails during raid set expansion and a hot spare is available, an auto rebuild operation will occur after the raid set expansion completes.

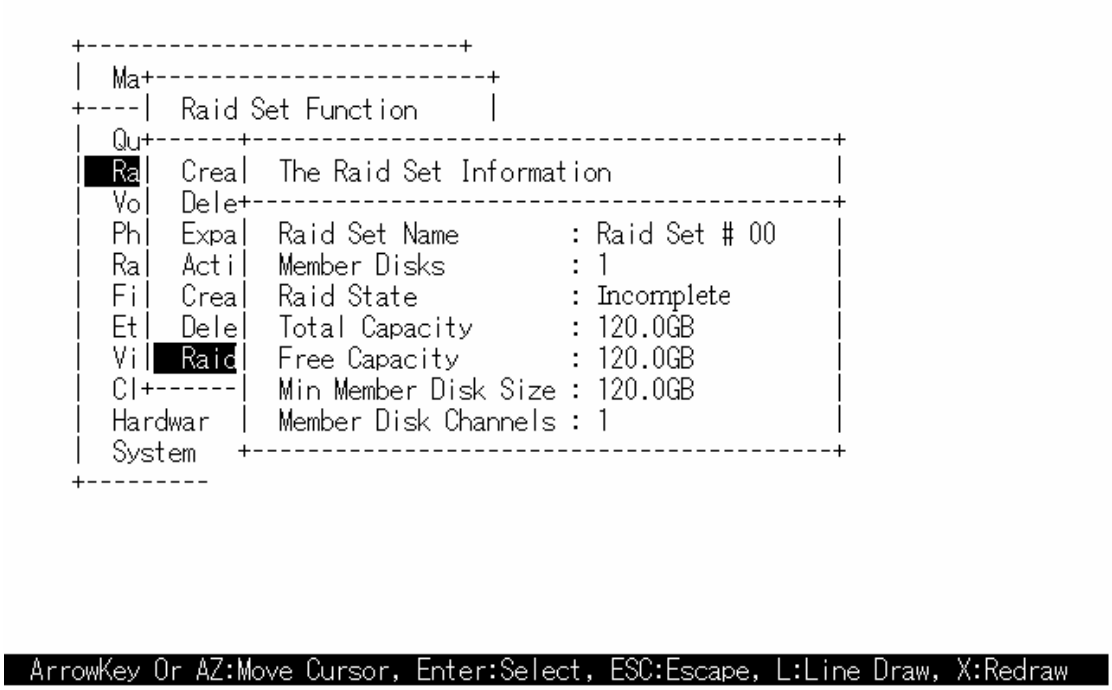
Migrating

Migrating occurs when a disk is added to a Raid Set. Migration status is displayed in the raid status area of the Raid Set information when a disk is added to a raid set. Migrating status is also displayed in the associated volume status area of the Volume Set Information when a disk is added to a raid set.

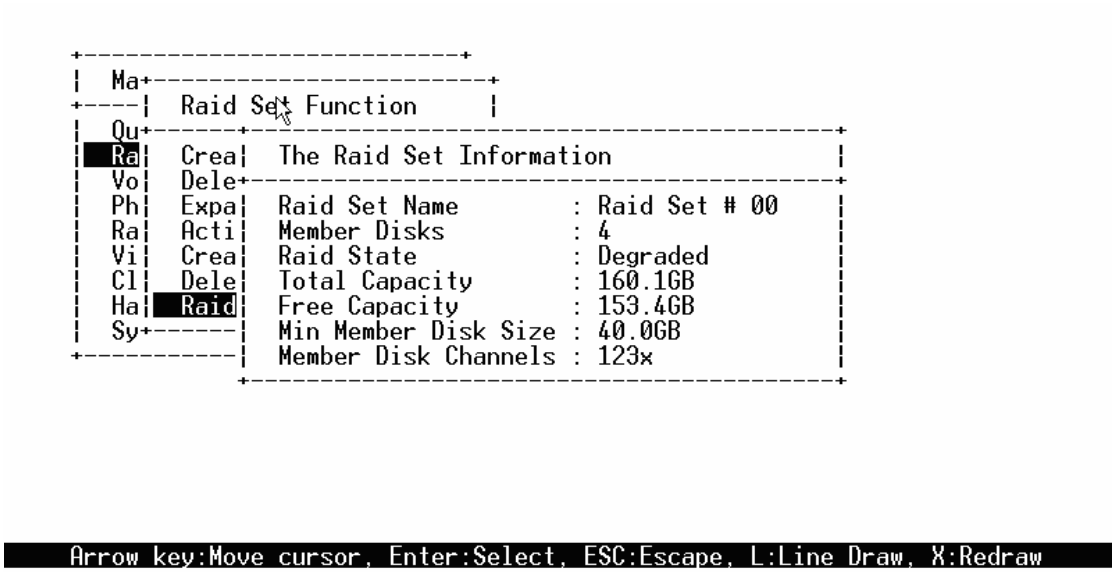


Activate Incomplete Raid Set

The following screen is the Raid Set Information after one of its disk drive has removed in the power off state.



When one of the disk drive is removed in power off state, the raid set state will change to Incomplete State. If users want to continue to work when the RAID subsystem is power on, users can use the **Activate Raid Set** option to active the raid set. After users complete the function, the Raid State will change to Degraded Mode.

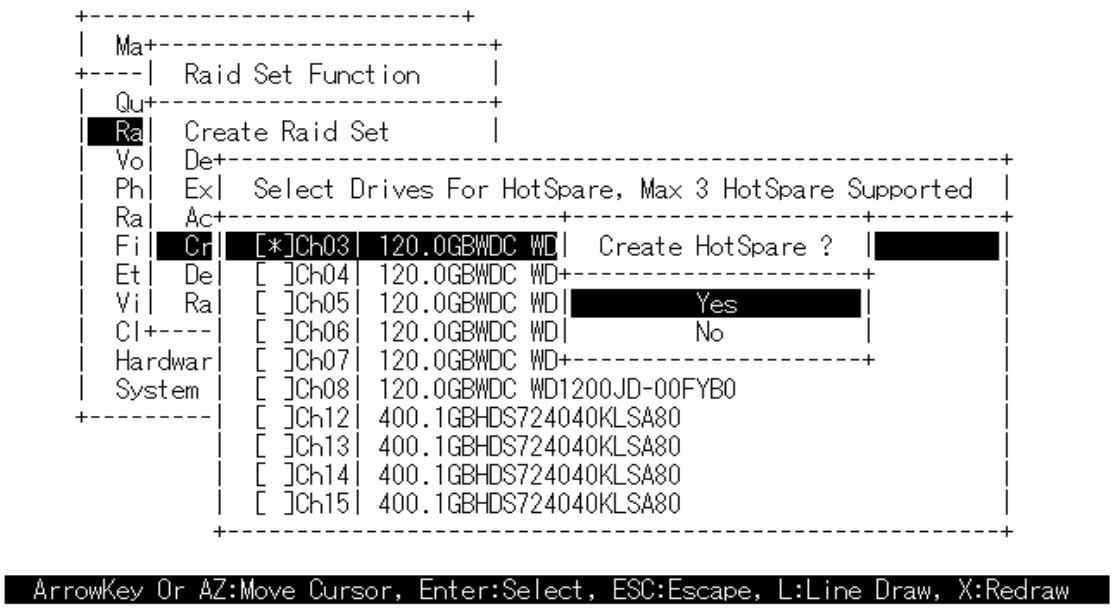


Create Hot Spare

When you choose the **Create Hot Spare** option in the Raid Set Function, all unused physical devices connected to the current controller appear: Select the target disk by clicking on the appropriate check box.

Press the **Enter** key to select a disk drive and press **Yes** in the Create Hot Spare to designate it as a hot spare.

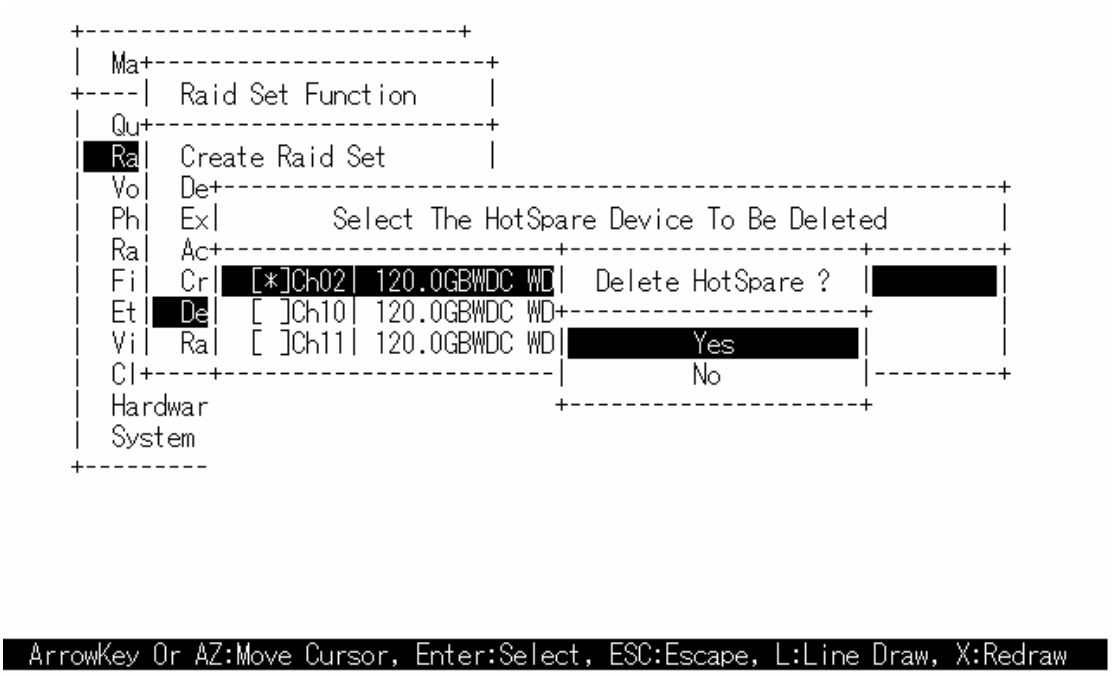
The create Hot Spare option gives you the ability to define a global hot spare.



Delete Hot Spare

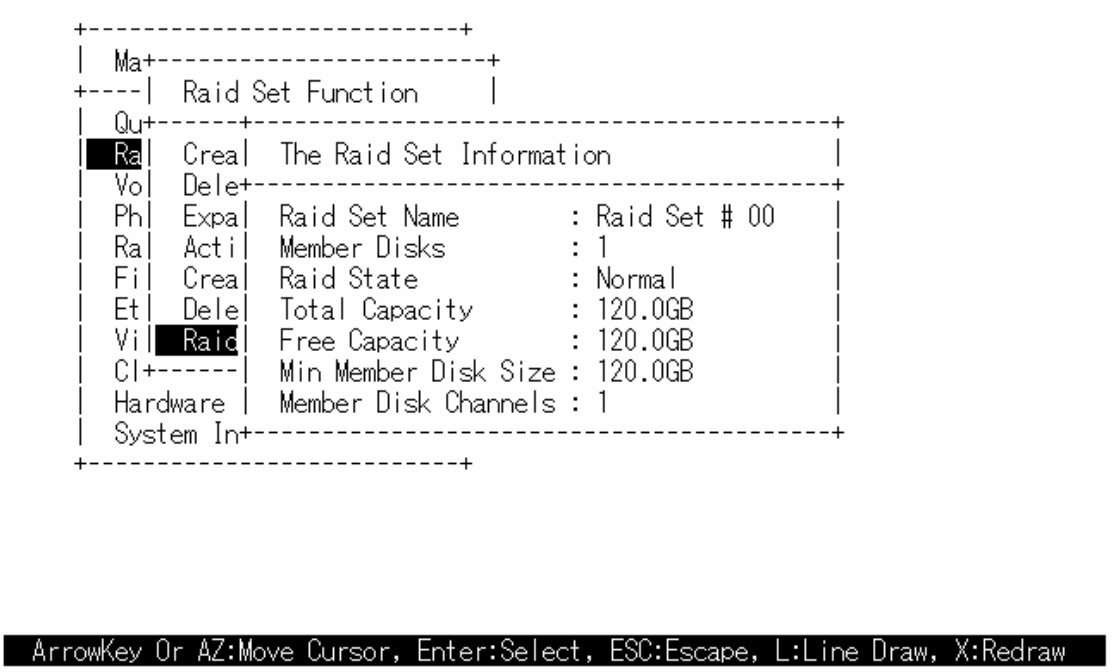
Select the target Hot Spare disk to delete by clicking on the appropriate check box.

Press the **Enter** keys to select a disk drive, and press **Yes** in the Delete Hot Spare to delete the hot spare.



Raid Set Information

To display Raid Set information, move the cursor bar to the desired Raid Set number, then press **Enter** key. The Raid Set Information will show as below. You can only view the information of this Raid Set.


Raid Set Function
The Raid Set Information
Raid Set Name : Raid Set # 00
Member Disks : 1
Raid State : Normal
Total Capacity : 120.0GB
Free Capacity : 120.0GB
Min Member Disk Size : 120.0GB
Member Disk Channels : 1
ArrowKey Or AZ:Move Cursor, Enter:Select, ESC:Escape, L:Line Draw, X:Redraw

Volume Set Function

A Volume Set is seen by the host system as a single logical device. It is organized in a RAID level with one or more physical disks. RAID level refers to the level of data performance and protection of a Volume Set. A Volume Set capacity can consume all or a portion of the disk capacity available in a Raid Set. Multiple Volume Sets can exist on a group of disks in a Raid Set**.** Additional Volume Sets created in a specified Raid Set will reside on all the physical disks in the Raid Set. Thus each Volume Set on the Raid Set will have its data spread evenly across all the disks in the Raid Set.

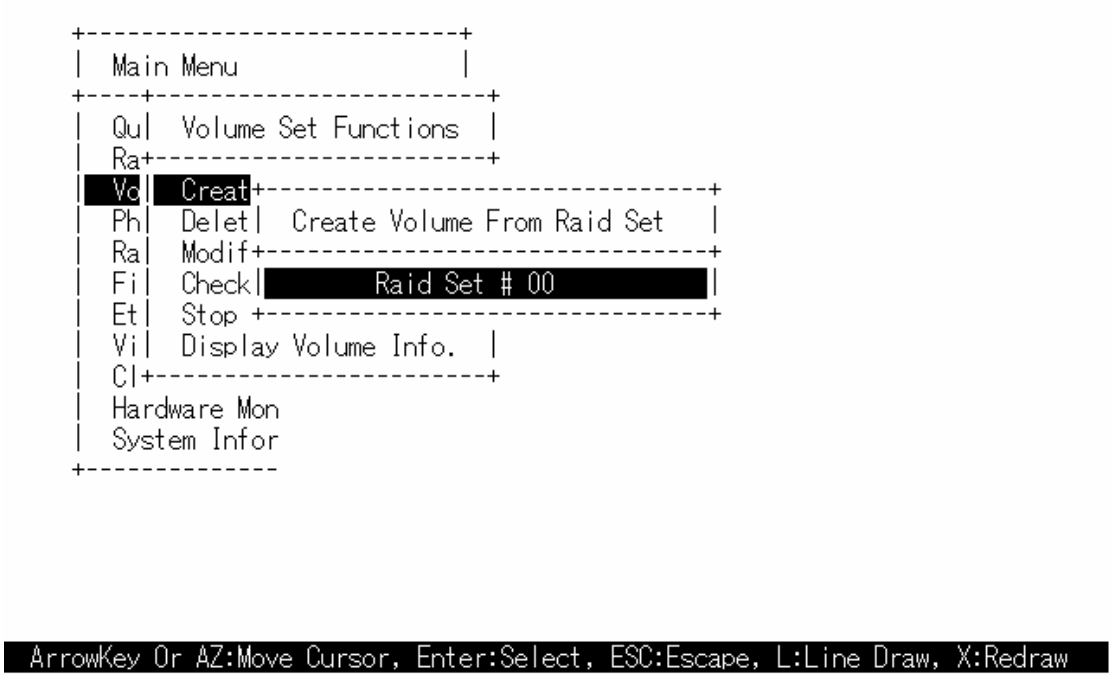
Create Volume Set

The following is the volume set features for the DAS-315FA2:

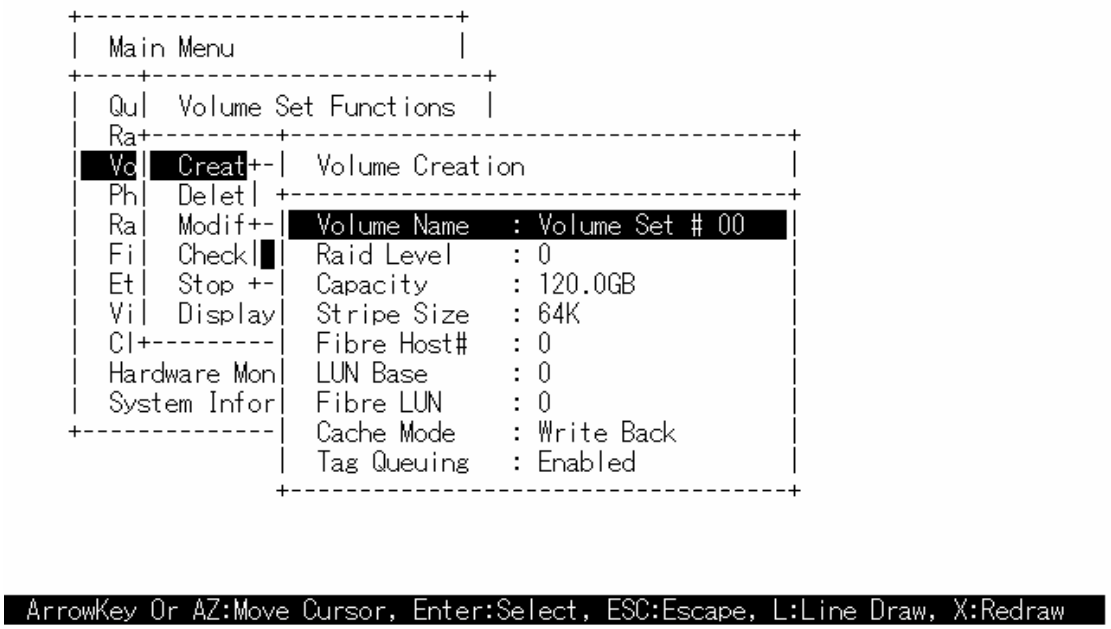
1. Volume sets of different RAID levels may coexist on the same raid set.
2. Up to 16 volume sets can be created in a raid set.
3. The maximum addressable size of a single volume set is 2 TB.

To create a volume set, follow the following steps:

1. Select the **Volume Set Function** from the Main menu.
2. Choose the **Create Volume Set** from **Volume Set Functions** dialog box screen.
3. The **Create Volume From Raid Set** dialog box appears. This screen displays the existing arranged raid sets. Select the raid set number and press **Enter** key. The **Volume Creation** is displayed in the screen.



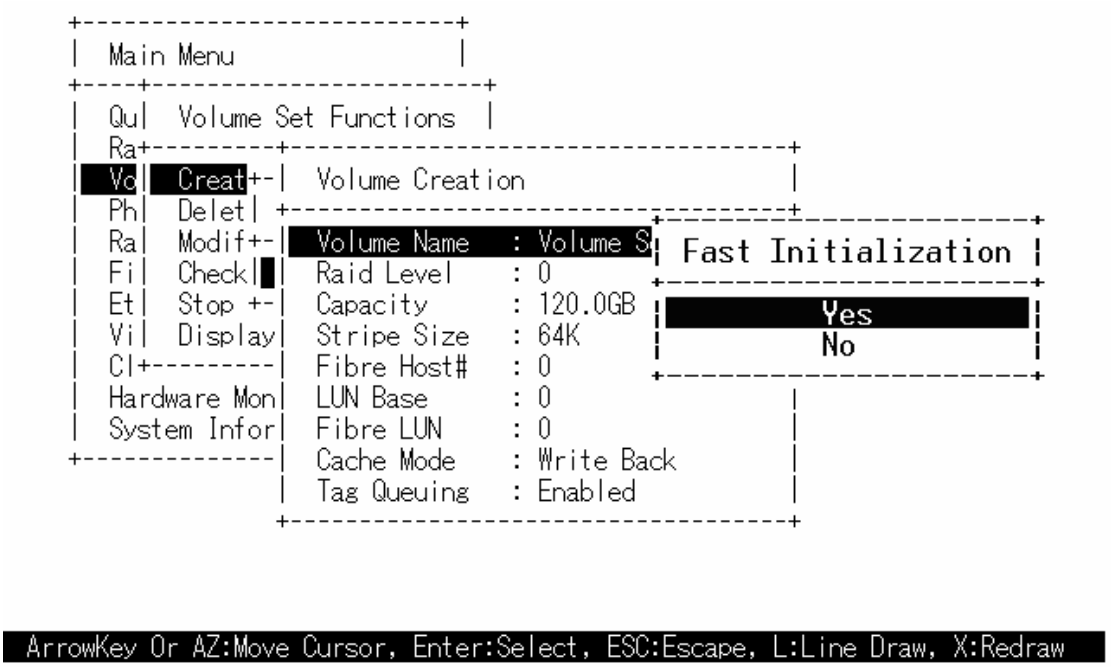
4. A window with a summary of the current volume set's settings. The "Volume Creation" option allows user to select the Volume Name, RAID level, Capacity, Stripe Size, Fibre Host Number, LUN Base, Fibre LUN, Cache Mode and Tag Queuing, User can modify the default values in this screen; the modification procedures are at 5.5.3.1.1.1 to 5.5.3.1.1.10 section.



5. After completing the modification of the volume set, press Esc key to confirm it. A Fast Initialization screen is presented.

   . Select **Yes** key to start the Fast Initialization of the selected volume set.

   . Select **No** key to start the Normal Initialization of the selected volume set.

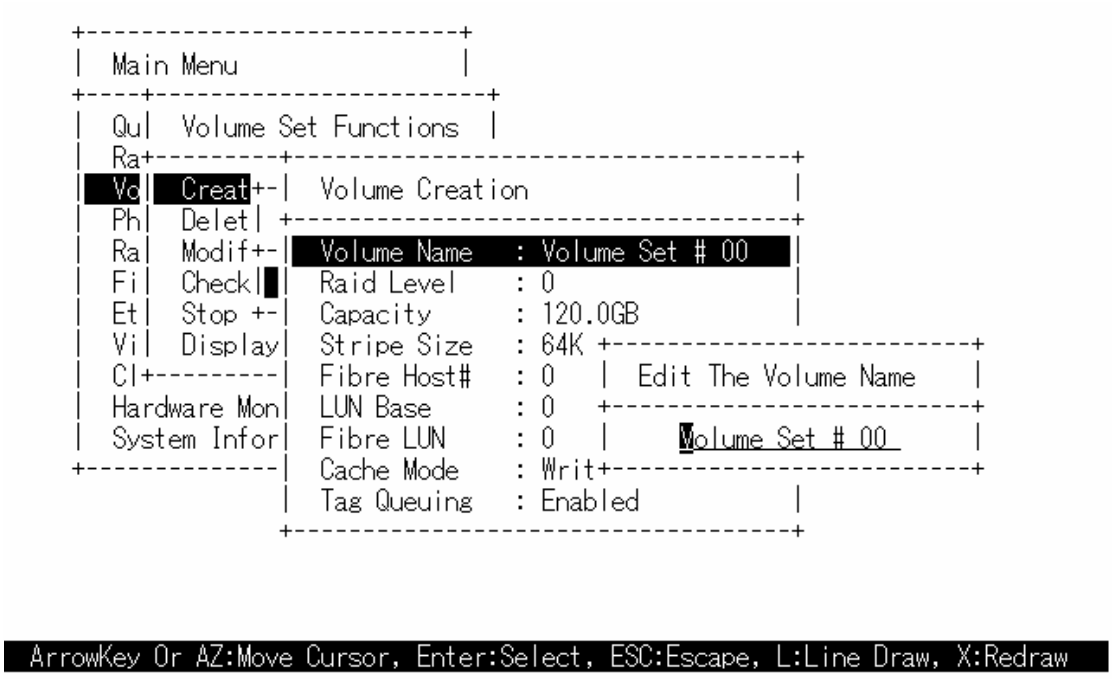


6. Repeat steps 3 to 5 to create additional volume sets.

7. The initialization percentage of volume set will be displayed at the button line.

Volume Name

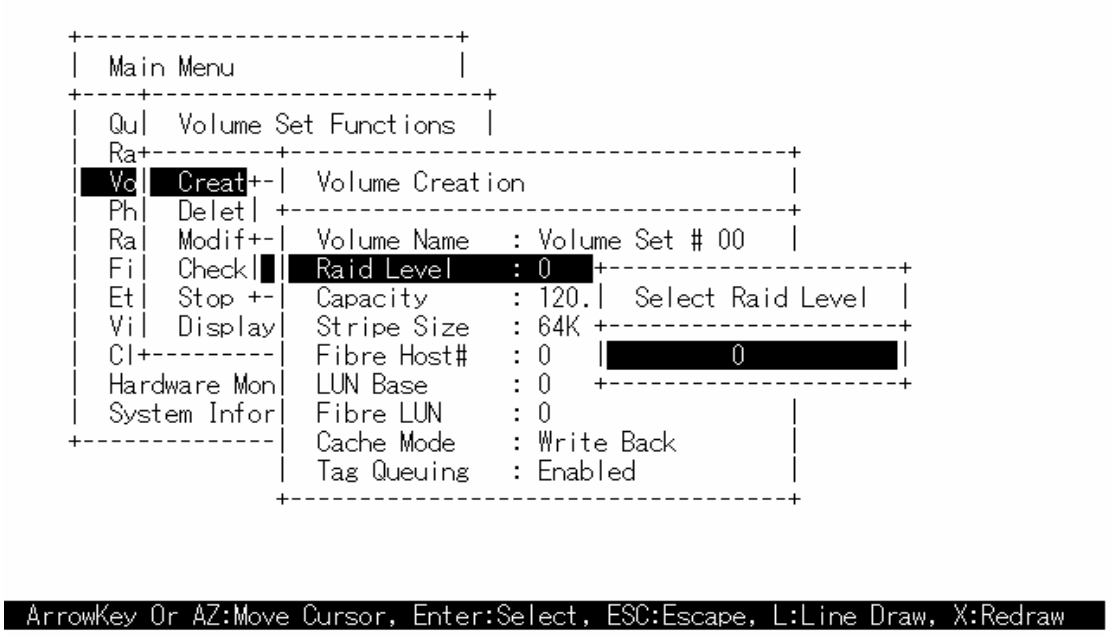
The default volume name will always appear as Volume Set. #. You can rename the volume set name providing it does not exceed the 16 characters limit.


Main Menu
Volume Set Functions
Volume Creation
Volume Name : Volume Set # 00
Raid Level : 0
Capacity : 120.0GB
Stripe Size : 64K
Fibre Host# : 0
LUN Base : 0
Fibre LUN : 0
Cache Mode : Writ
Tag Queuing : Enabled
Edit The Volume Name
Volume Set # 00
ArrowKey Or AZ:Move Cursor, Enter:Select, ESC:Escape, L:Line Draw, X:Redraw

Raid Level

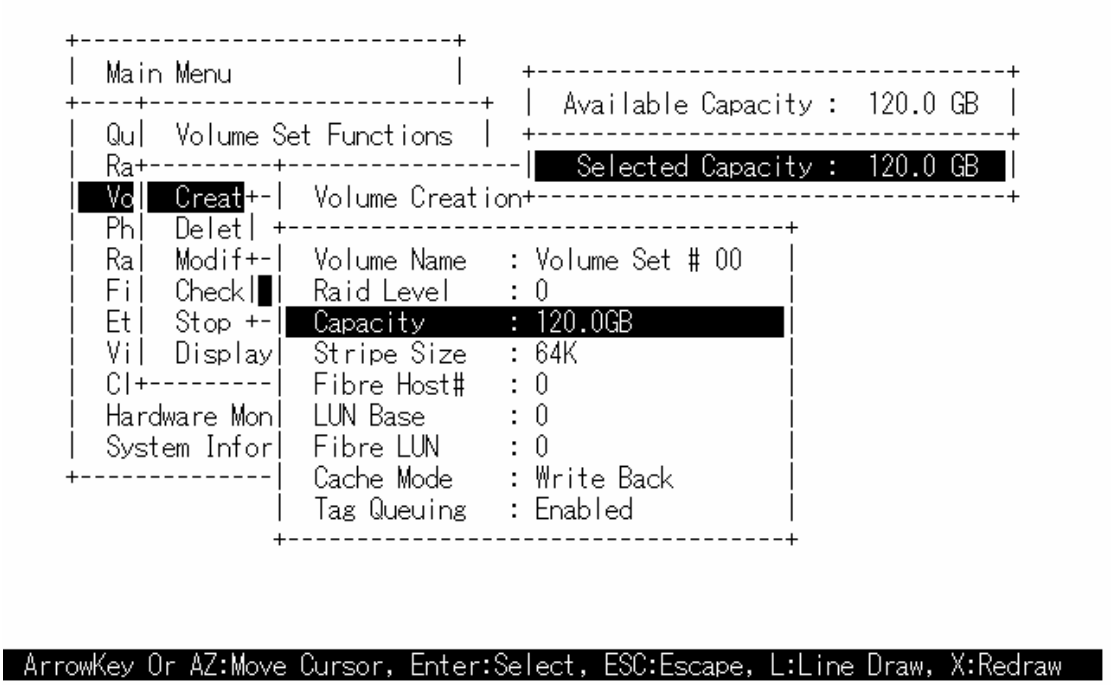
Set the RAID level for the Volume Set. Highlight *Raid Level* and press **Enter**.

The available RAID levels for the current Volume Set are displayed. Select a RAID level and press **Enter** key to confirm.



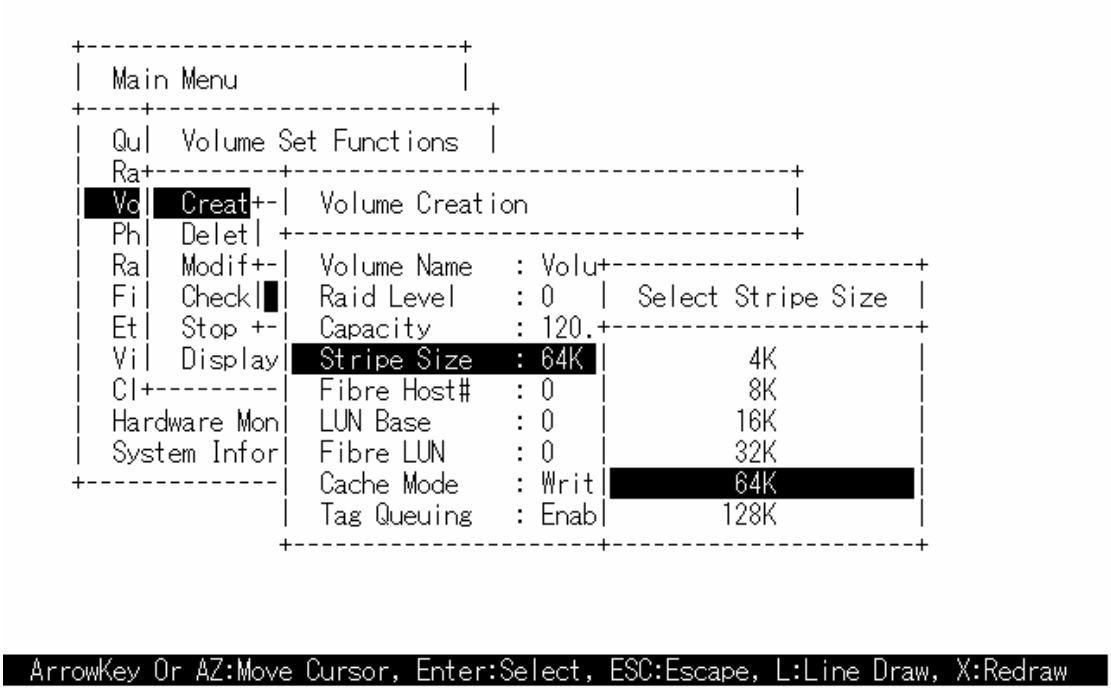
Capacity

The maximum volume size is default in the first setting. The capacity can increase or decrease by the **UP** and **DOWN** arrow key. Each volume set has a selected capacity which is less than or equal to the total capacity of the raid set on which it resides.



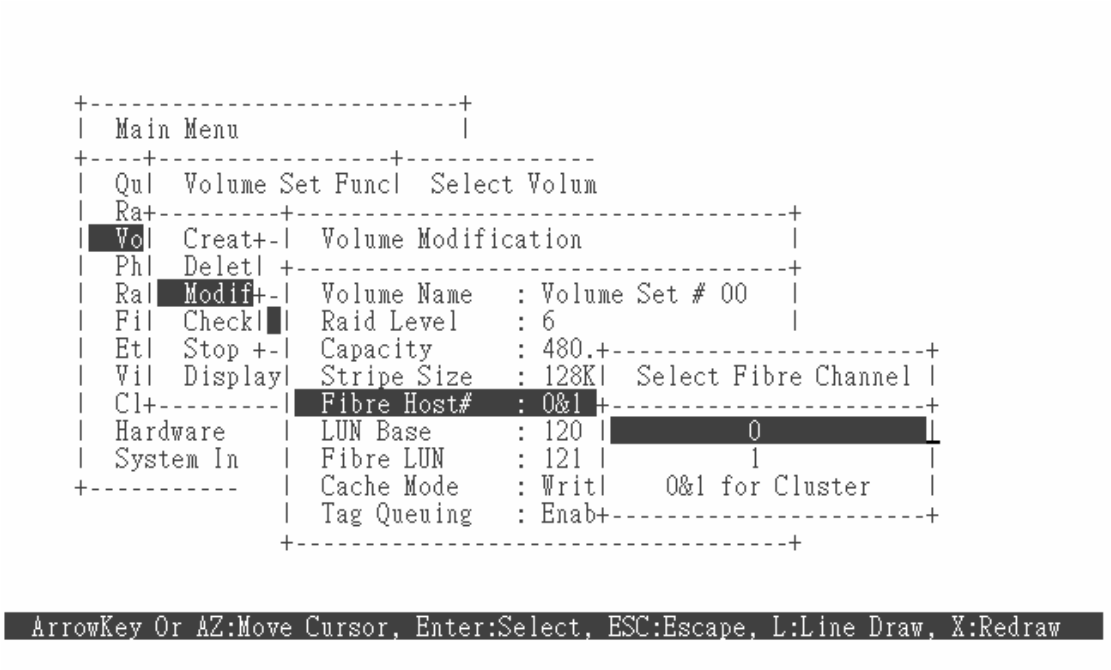
Strip Size

This parameter sets the size of the segment written to each disk in a RAID 0, 1(0+1), 5 or 6 logical drive. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB.



Fibre Host Number

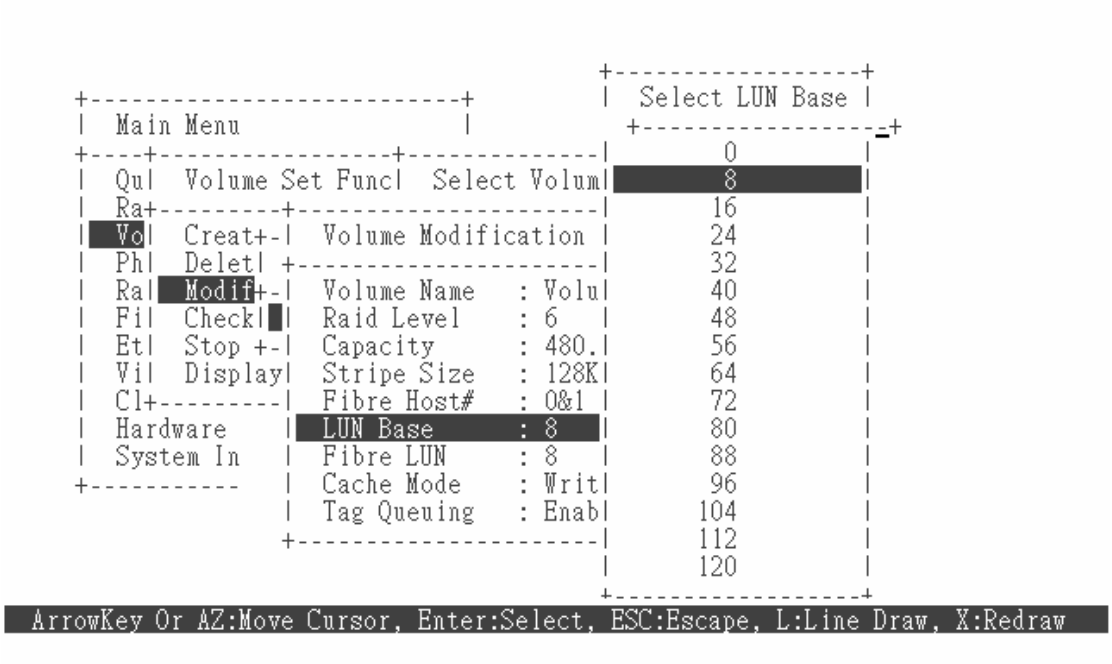
Two Fibre channels can be applied to the internal RAID subsystem. Choose. A **Select Fibre Channe**l dialog box will appear; select the channel number or 0&1 for Cluster. and press **Enter** key to confirm it.

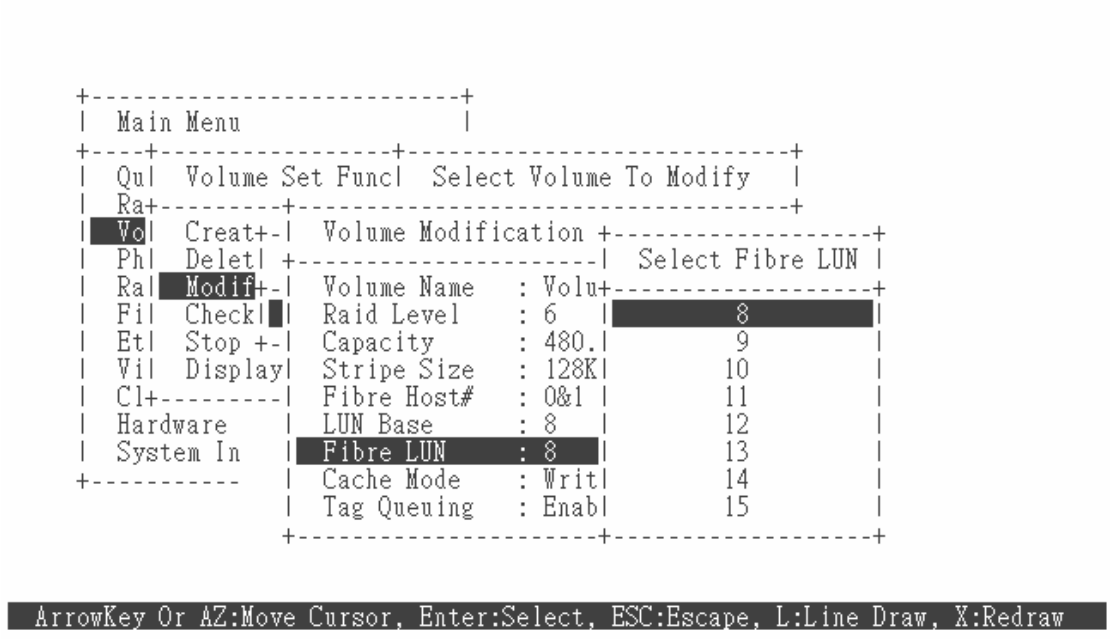


LUN Base and Fibre LUN

As it offers up to 128 LUN Bases, please select first LUN Base first in this option, and then select Fibre LUN in next option.

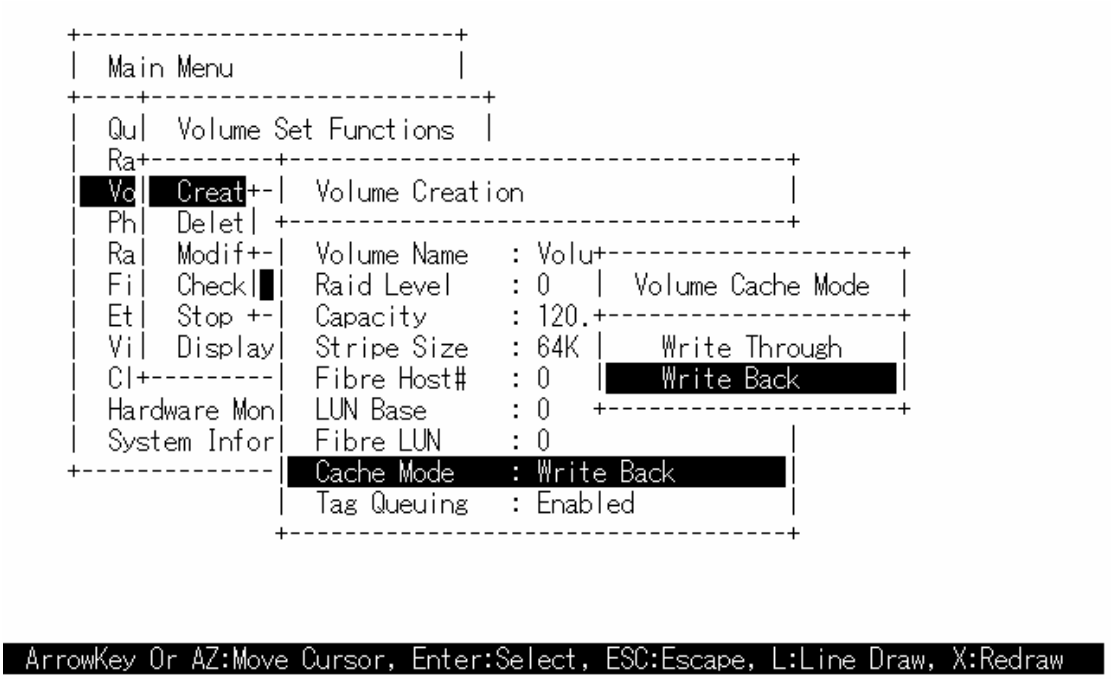
For example, if you select 0 as your LUN Base, you can select from 0 to 7 as your Fibre LUN. If you select 1 as your LUN Base, please select from 8 to 16 as your Fibre LUN.





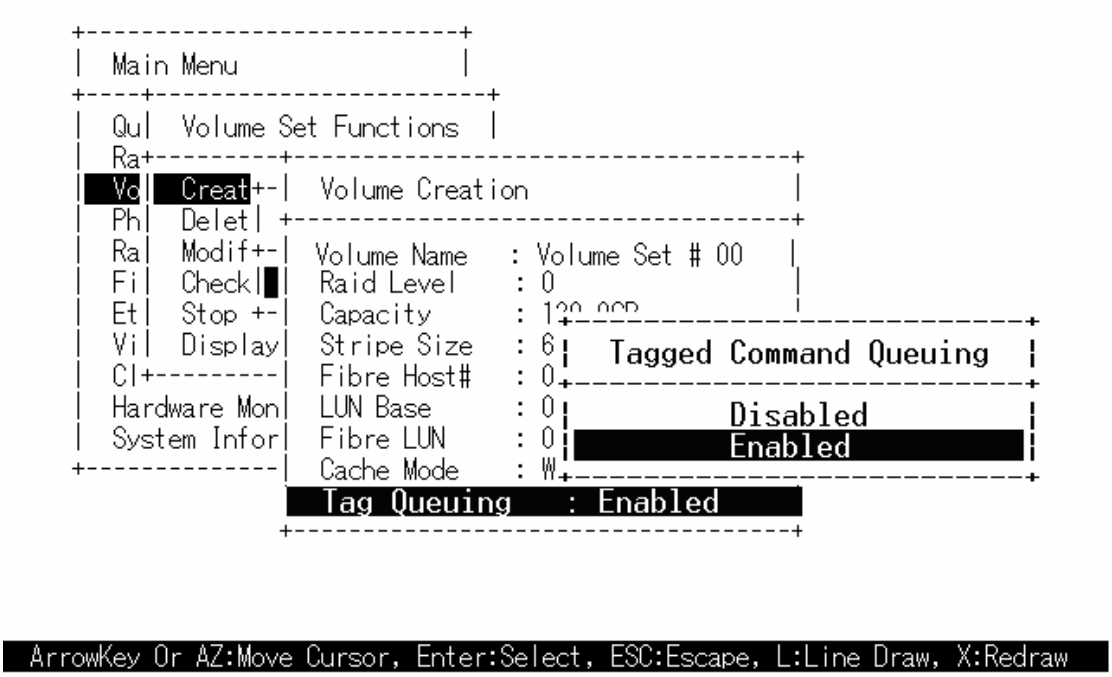
Cache Mode

User can set the cache mode to: **Write-Through Cache** or **Write-Back Cache.**



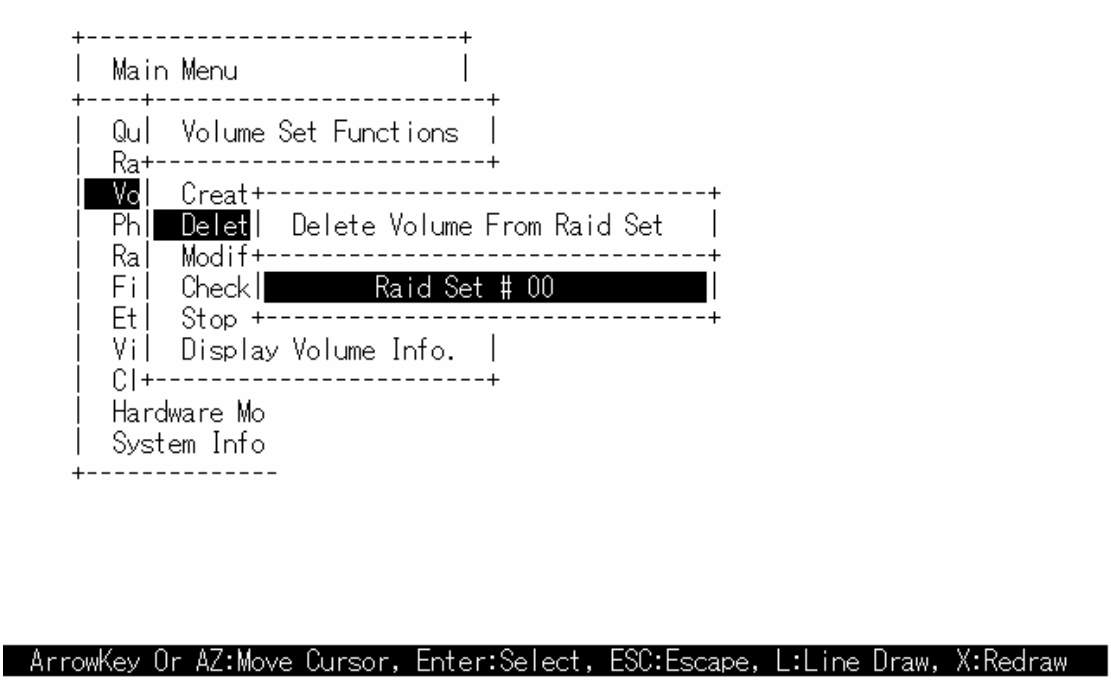
Tag Queuing

The Enabled option is useful for enhancing overall system performance under multi-tasking operating systems. The Command Tag (Host Channel) function controls the SCSI command tag queuing support for each Host channel. This function should normally remain enabled. Disable this function only when using older SCSI drives that do not support command tag queuing



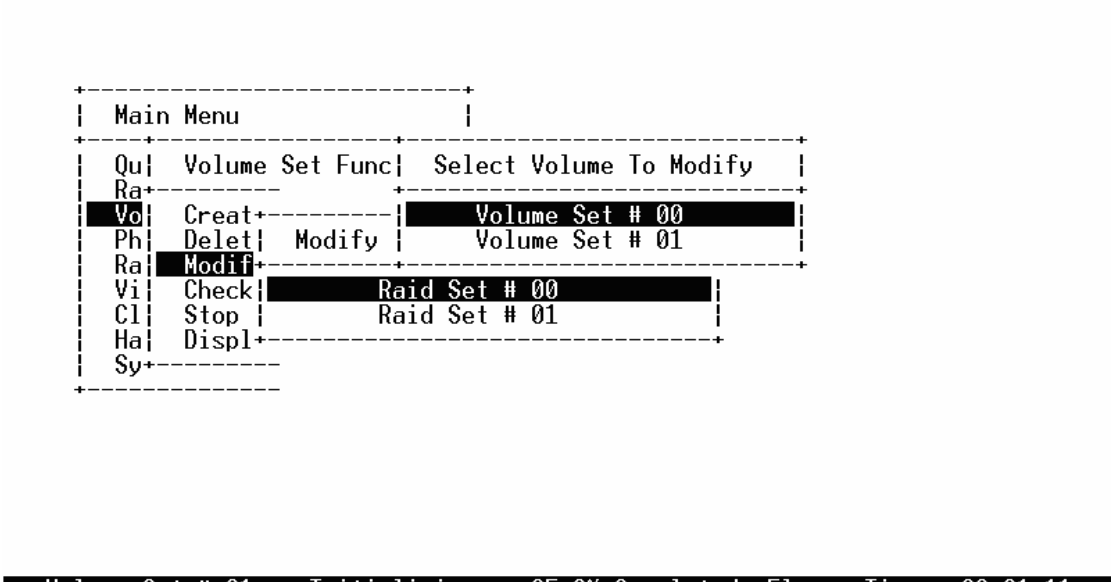
Delete Volume Set

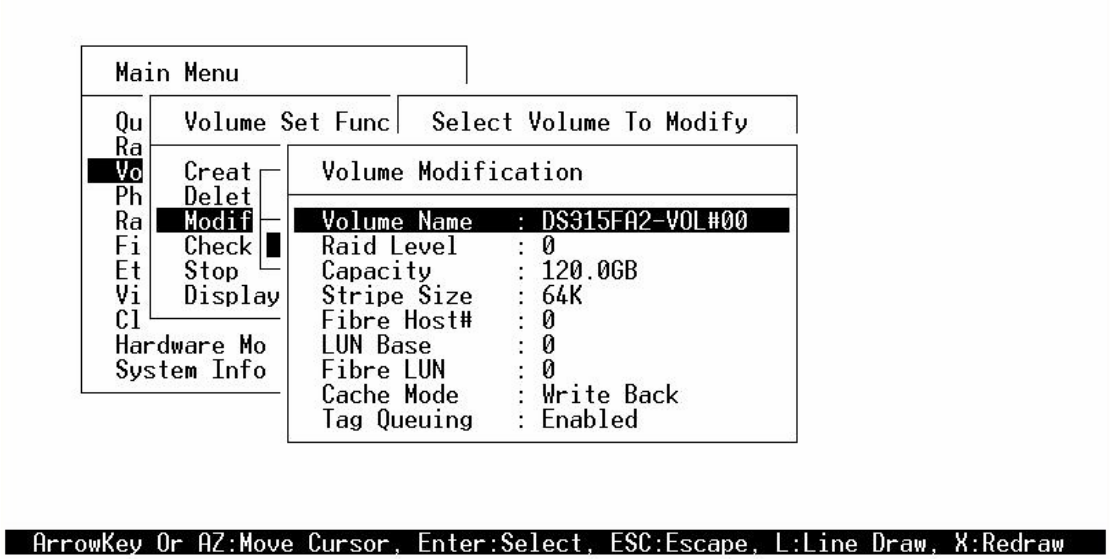
To delete Volume set from raid set system function, move the cursor bar to the **Volume Set Functions** menu and select the **Delete Volume Set** item, then press **Enter** key. The **Volume Set Functions** menu will show all Raid Set # item. Move the cursor bar to an RAID Set number, then press **Enter** key to show all Volume Set # in the raid set. Move cursor to the deleted Volume Set number, press **Enter** key to delete it.


Main Menu
Volume Set Functions
Delete Volume From Raid Set
Raid Set # 00
Display Volume Info.
ArrowKey Or AZ:Move Cursor, Enter:Select, ESC:Escape, L:Line Draw, X:Redraw

Modify Volume Set

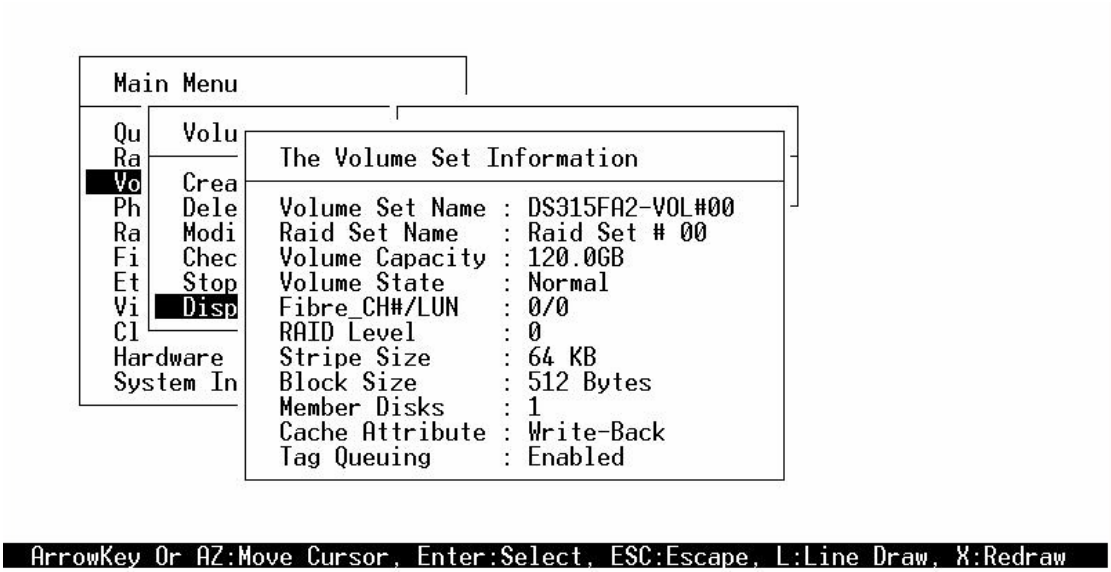
Use this option to modify volume set configuration. To modify Volume Set values from Raid Set system function, move the cursor bar to the Volume Set Functions menu and select the **Modify Volume Set** item, then press **Enter** key. The Volume Set Functions menu will show all Raid Set number items. Move the cursor bar to an Raid Set number item, then press **Enter** key to show all Volume Set item Select the Volume Set from the list you which to change, press **Enter** key to modify it.





To modify, choose this option to display the properties of the selected Volume Set; you can modify all values except the capacity.

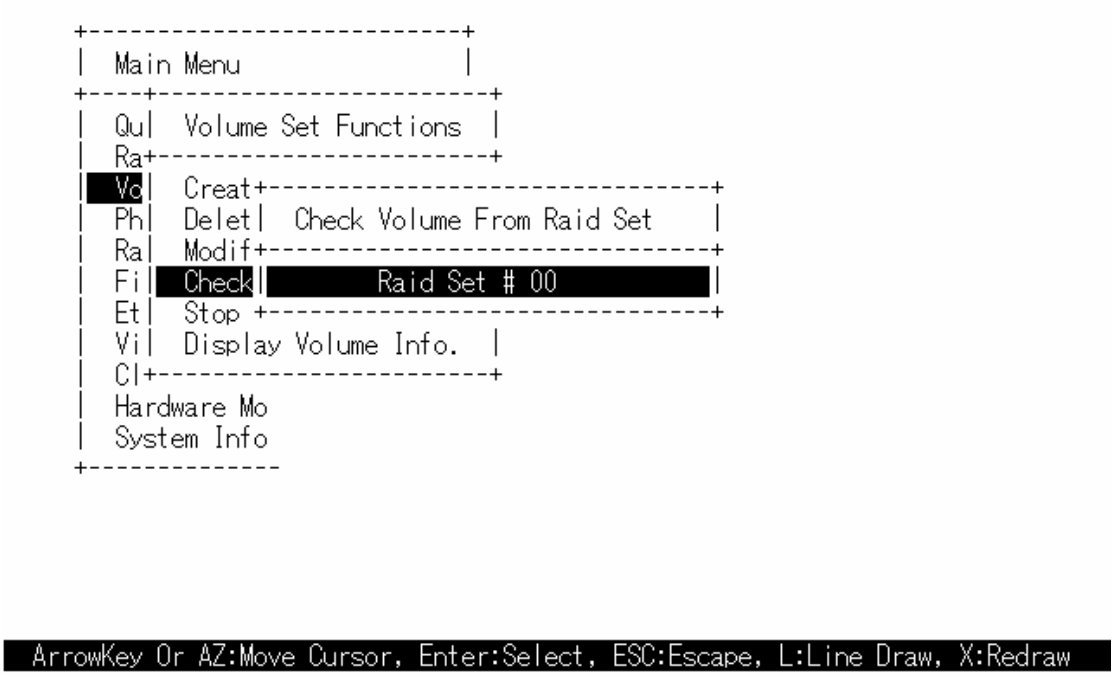
Volume Set Migration



Migrating occurs when a volume set is migrating from one RAID level to another, a Volume set strip size changes, or when a disk is added to a Raid Set. Migration status is displayed in the volume status area of the **Volume Set Information** when one RAID level to another, a Volume set strip size changes or when a disk is added to a raid set.

Check Volume Set

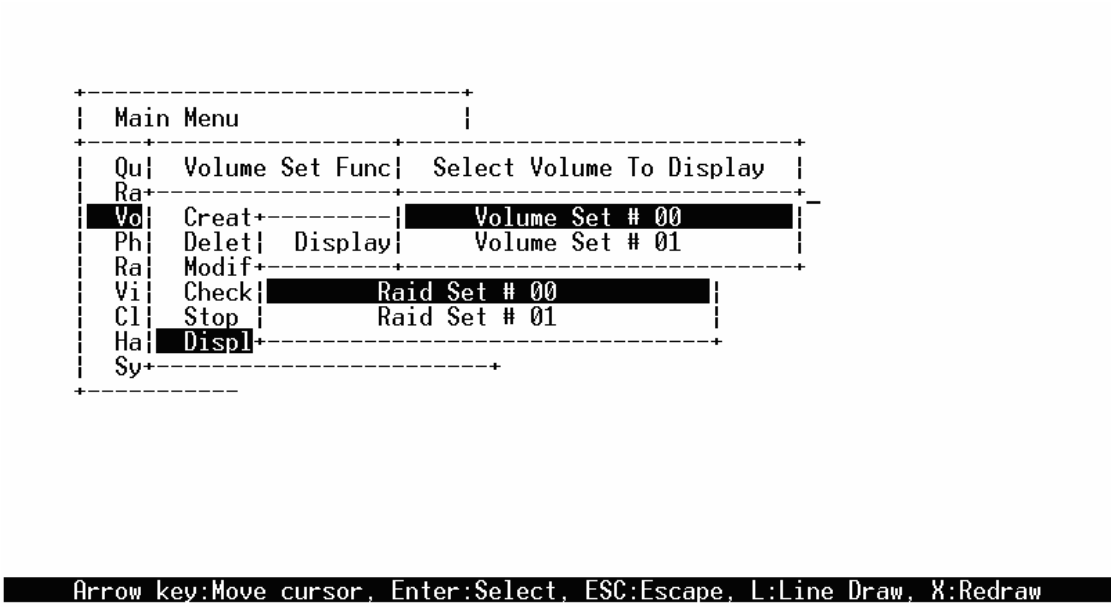
Use this option to verify the correctness of the redundant data in a volume set. For example, in a system with dedicated parity, volume set check means computing the parity of the data disk drives and comparing the results to the contents of the dedicated parity disk drive. To check Volume Set from Raid Set system function, move the cursor bar to the **Volume Set Function** menu and select the **Check Volume Set** item, then press **Enter** key. The Volume Set Functions menu will show all Raid Set number items. Move the cursor bar to a Raid Set number item, then press **Enter** key to show all Volume Set item. Select the Volume Set from the list you which to check, press **Enter** key to select it. After completing the selection, the confirmation screen appears, presses **Yes** to start check.



Stop Volume Set Check

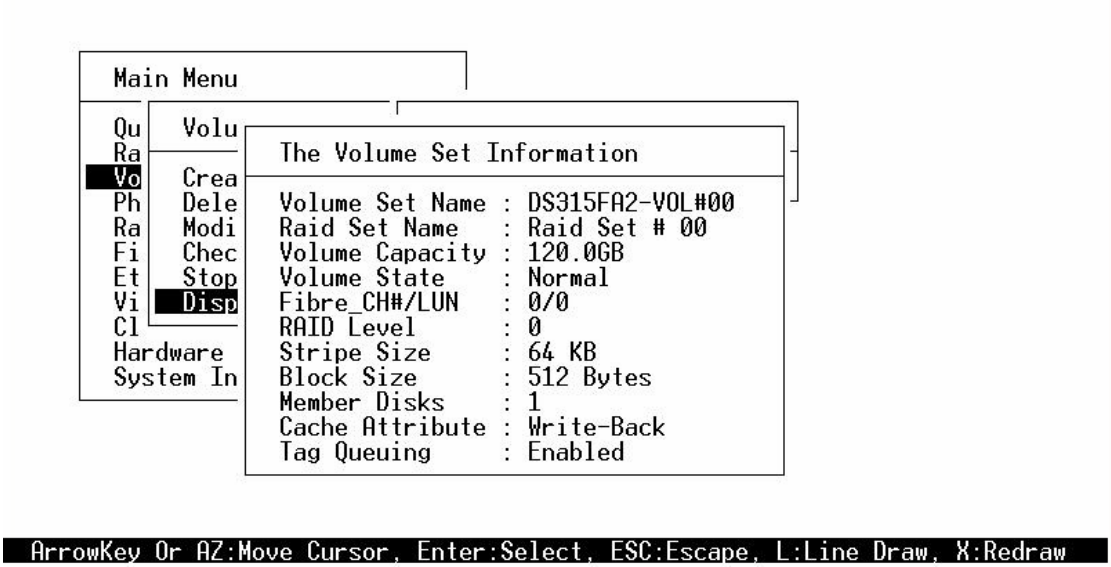
Use this option to stop all the Check Volume Set function.

Display Volume Set Info.



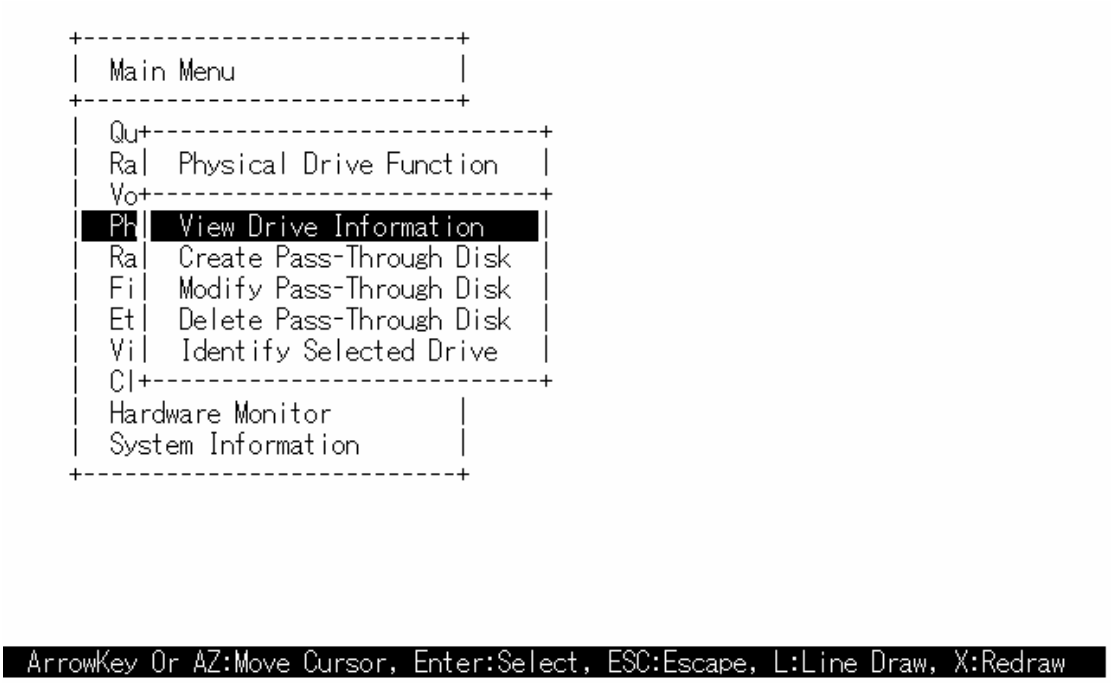
To display Volume Set information, move the cursor bar to the desired Volume Set number, then press **Enter** key. The Volume Set Information will show as following.

You can only view the information of this Volume Set.



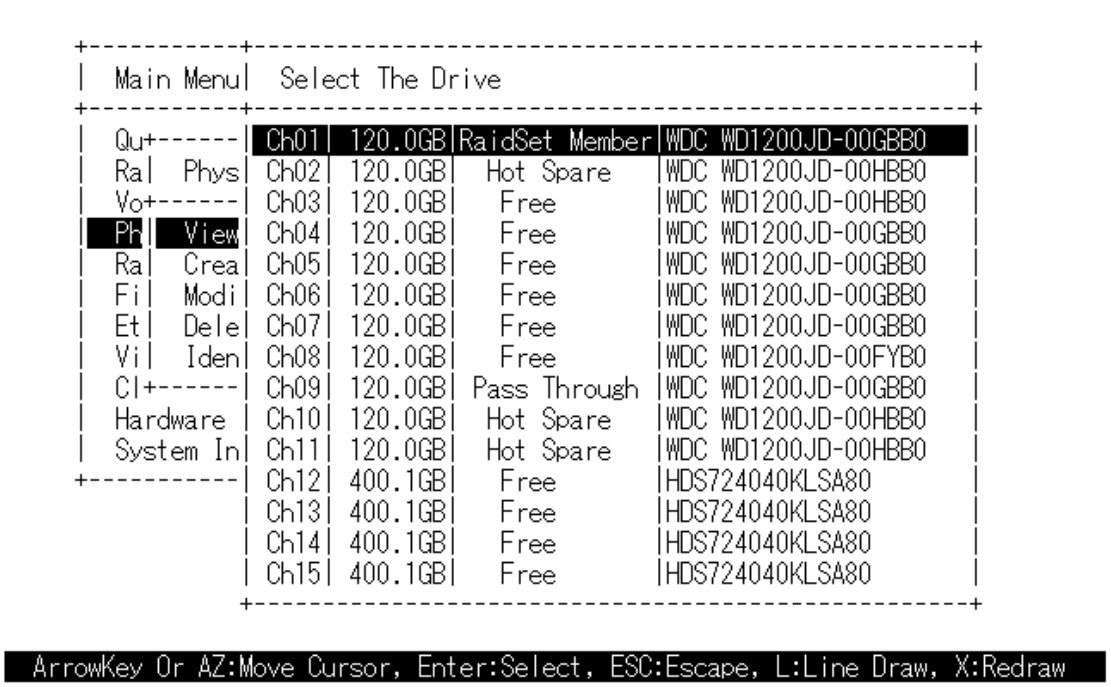
Physical Drive

Choose this option from the Main Menu to select a physical disk and to perform the operations listed above.

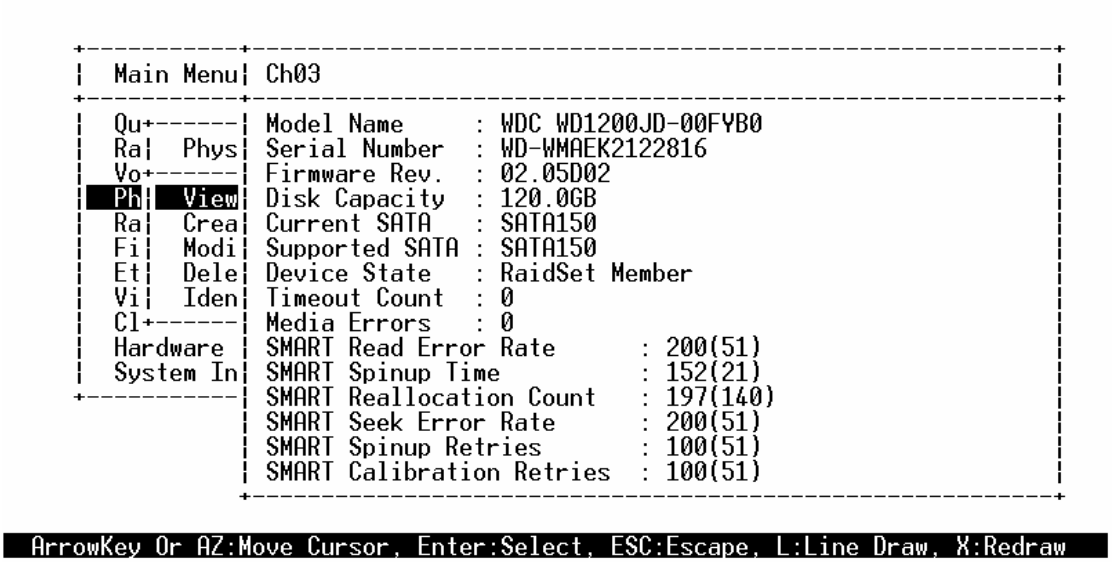


View Drive Information

When you choose this option, the physical disks in the RAID subsystem are listed. Move the cursor to the desired drive and press **Enter**. The following appears:

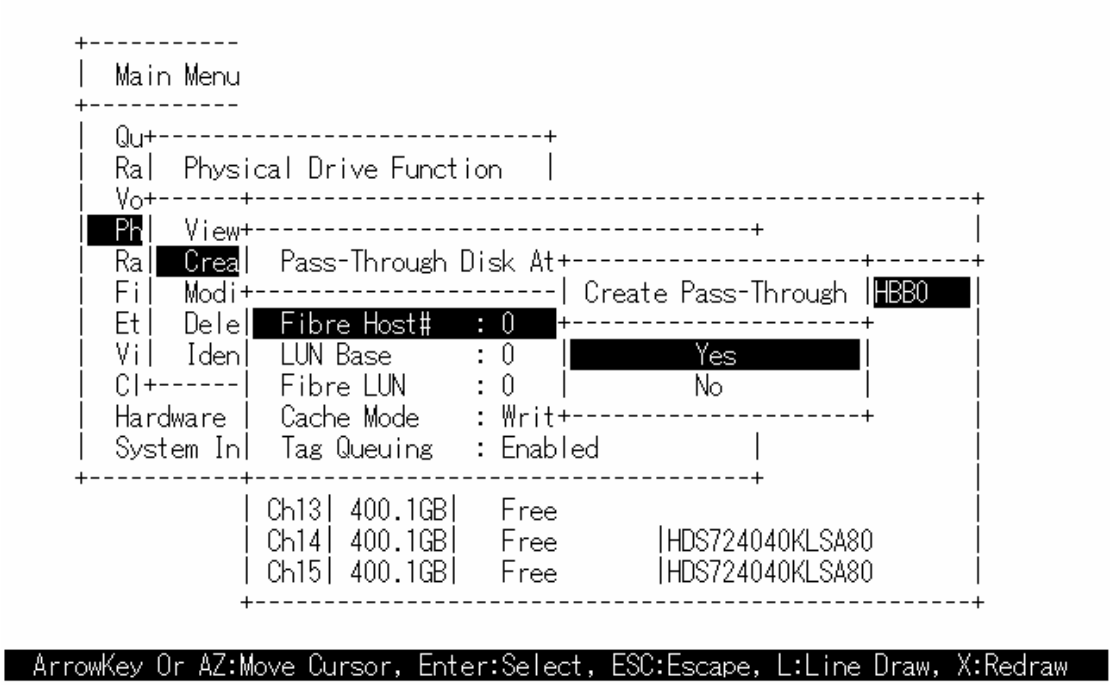


Select the drive you want to view, the following screen will appear. It allows you to view the drive information.



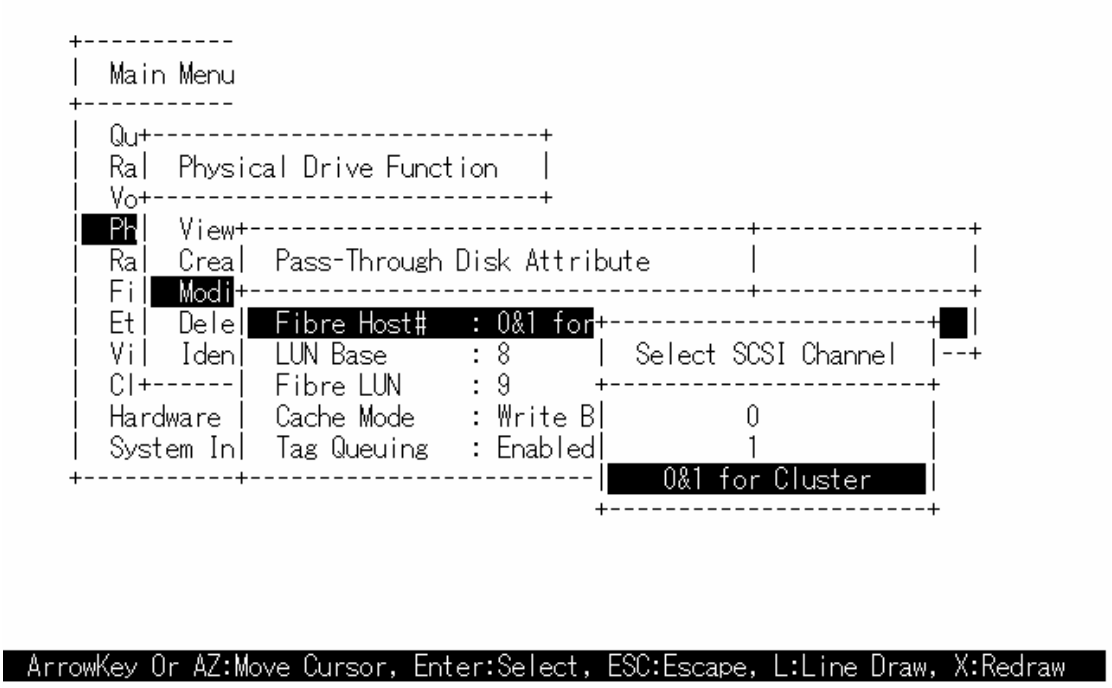
Create Pass-Through Disk

Disk is no controlled by the RAID subsystem firmware and thus cannot be a part of a Volume Set. The disk is available to the operating system as an individual disk. It is typically used on a system where the operating system is on a disk not controlled by the RAID subsystem firmware. To Create Pass-Through Disk, select **Create Pass-Through Disk**, then select the drive. You can view the Pass-Through Disk attribute. And then select SCSI Channel, press **Yes** to create pass-through disk.



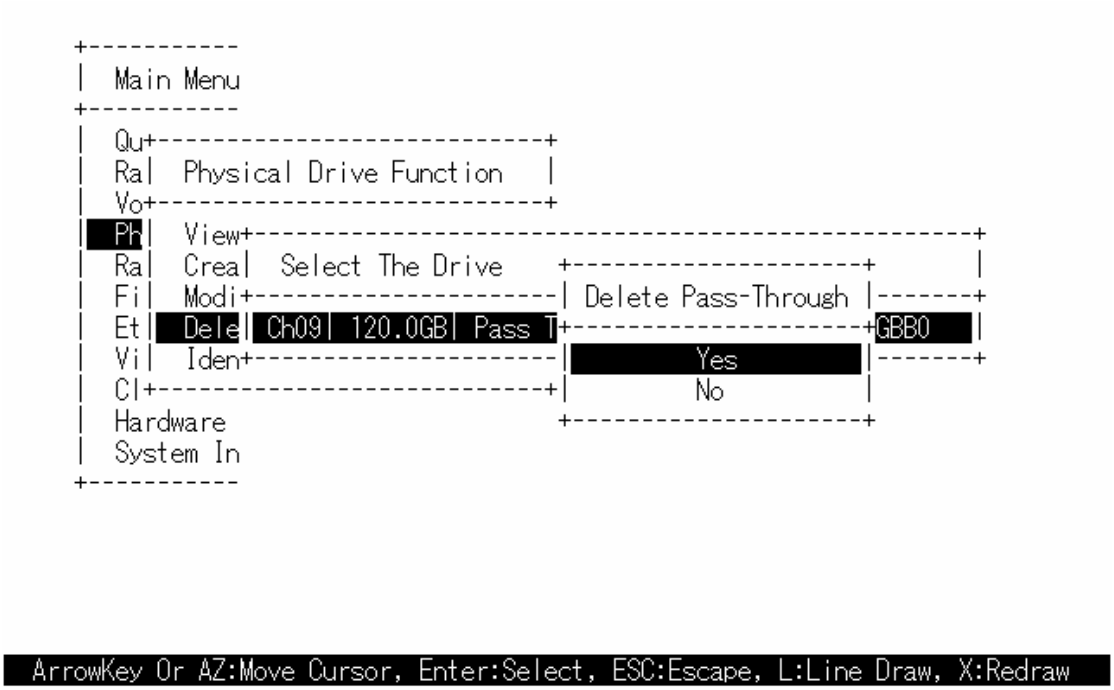
Modify Pass-Through Disk

Use this option to modify the Pass-Through Disk Attribute. To modify Pass-Through Disk parameters values from Pass-Through Disk pool, move the cursor bar to the Physical Drive Function menu and select the **Modify Pass-Through Drive** option and then press **Enter** key. The Physical Drive Function menu will show all Raid Pass-Through Drive number option. Move the cursor bar to a desired item, then press **Enter** key to show all Pass-Through Disk Attribute. Select the parameter from the list you which to change, press **Enter** key to modify it.



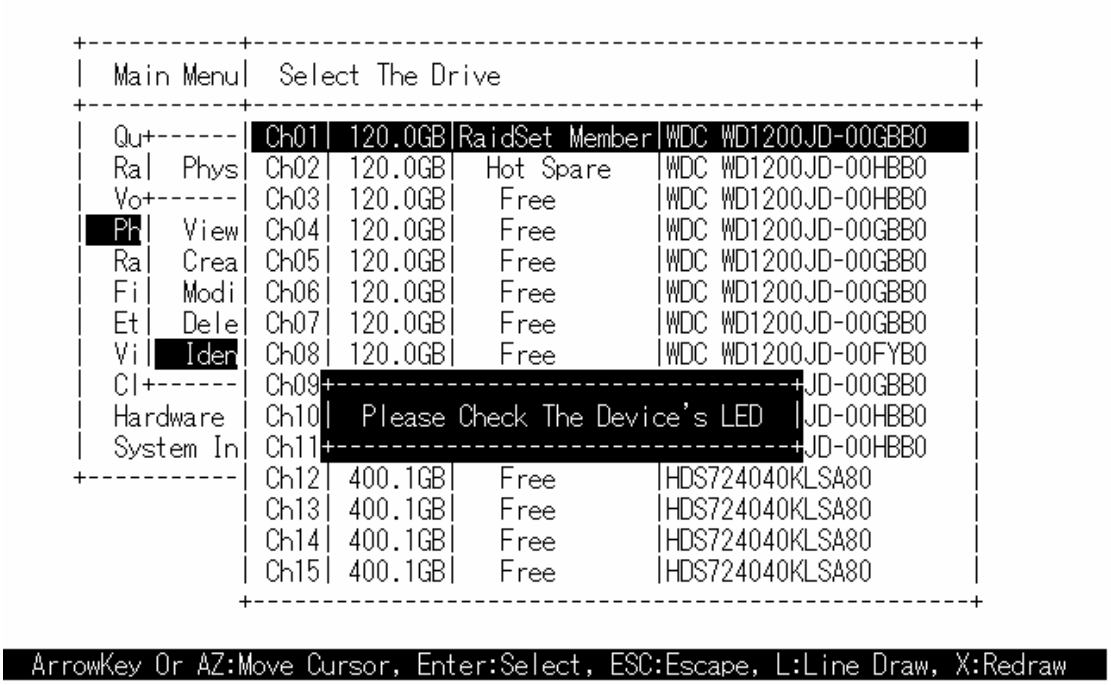
Delete Pass-Through Disk

To delete Pass-through drive from the Pass-through drive pool, move the cursor bar to the Physical Drive Function menu and select the Delete pass-through drive item, then press **Enter** key. The Delete Pass-Through confirmation screen will appear and press **Yes** key to delete it.



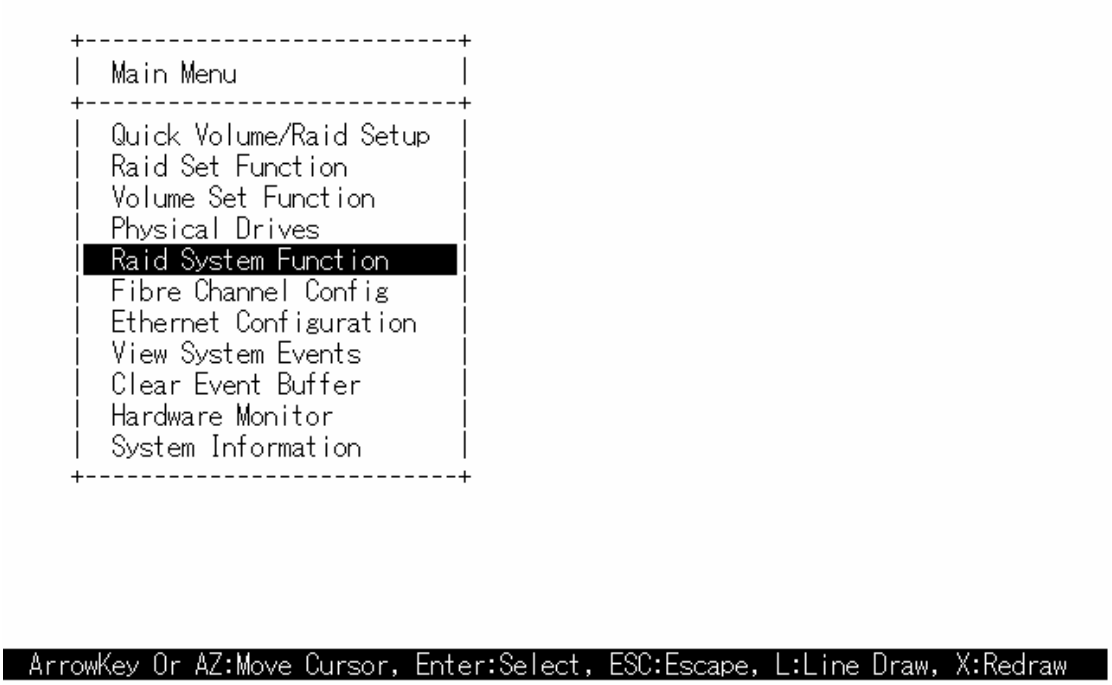
Identify Selected Drive

To prevent removing the wrong drive, the selected disk HDD LED Indicator will light for physically locating the selected disk when the **Identify Selected Device** is selected.



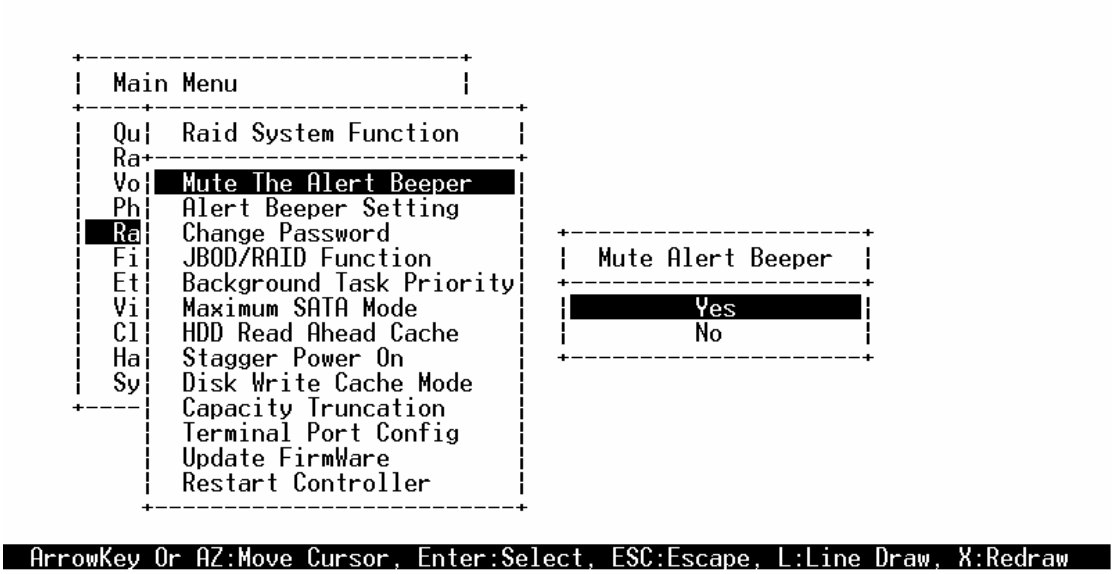
Raid System Function

To set the raid system function, move the cursor bar to the main menu and select the **Raid System Function** item and then press **Enter** key. The Raid System Function menu will show all items. Move the cursor bar to an item, then press **Enter** key to select the desired function.



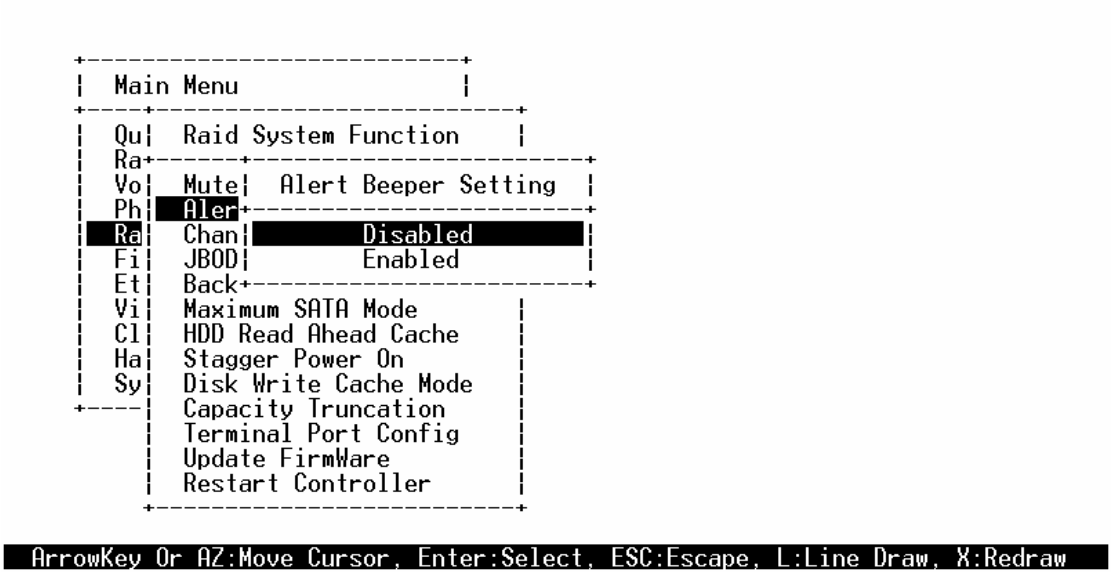
Mute The Alert Beeper

The Mute The Alert Beeper function item is used to control the RAID subsystem Beeper. Select the **Yes** and press **Enter** key in the dialog box to turn the beeper off temporarily. The beeper will still activate on the next event.



Alert Beeper Setting

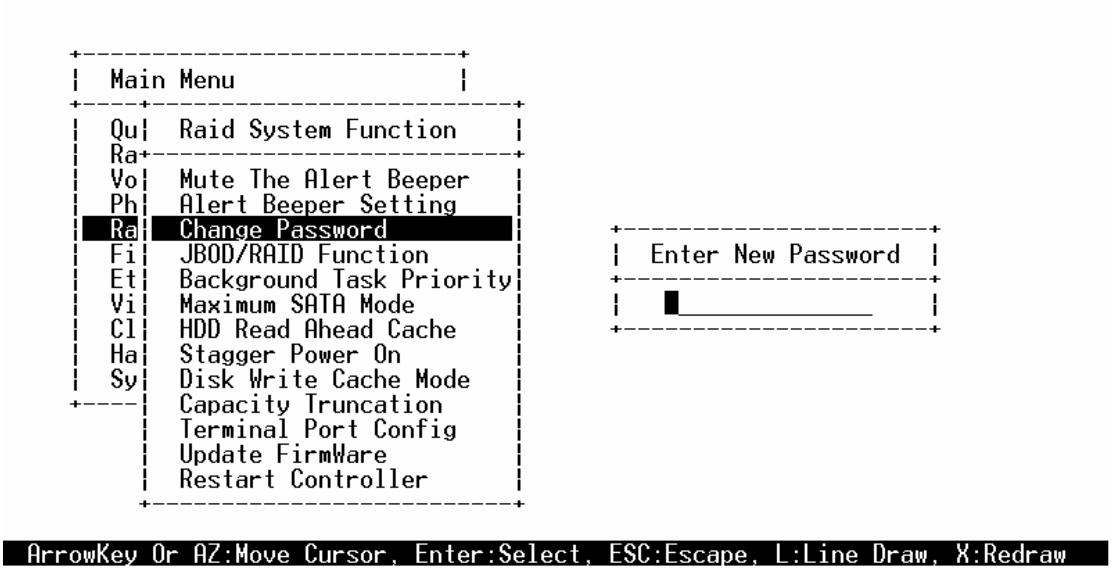
The Alert Beeper function item is used to Disabled or Enable the RAID subsystem controller alarm tone generator. Select the **Disabled** and press **Enter** key in the dialog box to turn the beeper off.



Change Password

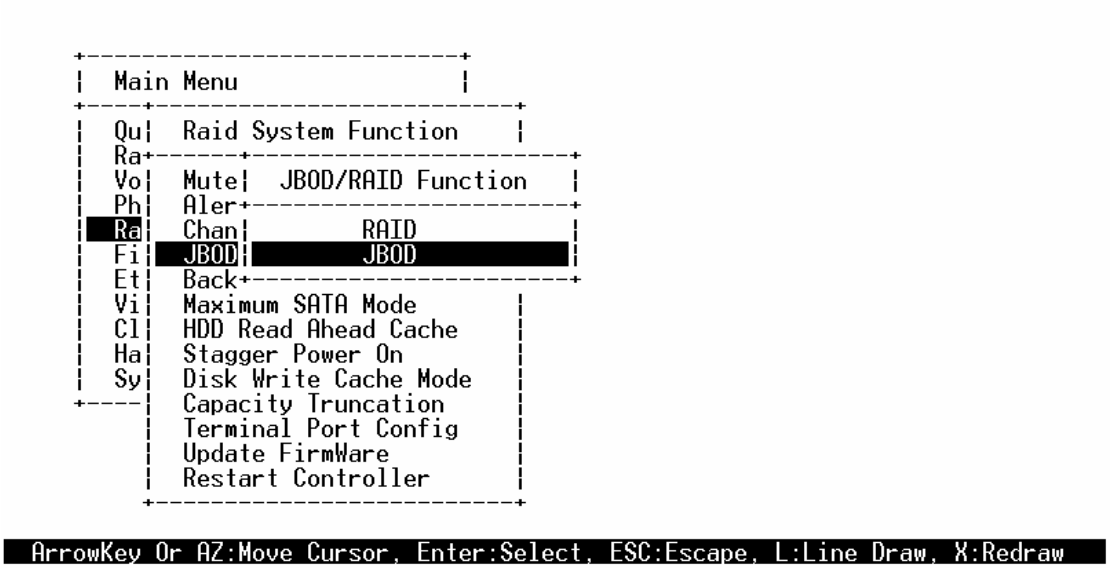
The password option allows user to set or clear the raid subsystem's password protection feature. Once the password has been set, the user can only monitor and configure the raid subsystem by providing the correct password. The password is used to protect the internal RAID subsystem from unauthorized entry. The controller will check the password only when entering the Main menu from the initial screen. The RAID subsystem will automatically go back to the initial screen when it does not receive any command in twenty seconds. To set or change the RAID subsystem password, move the cursor to Raid System Function screen, press the Change Password item. The Enter New Password screen appears.

To disable the password, press **Enter** only in both the **Enter New Password** and **Re-Enter New Password** column. The existing password will be cleared. No password checking will occur when entering the main menu from the starting screen.


Main Menu
Qu
Ra
Vo
Ph
Ra
Fi
Et
Vi
Cl
Ha
Sy
Raid System Function
Mute The Alert Beeper
Alert Beeper Setting
Change Password
JBOD/RAID Function
Background Task Priority
Maximum SATA Mode
HDD Read Ahead Cache
Stagger Power On
Disk Write Cache Mode
Capacity Truncation
Terminal Port Config
Update FirmWare
Restart Controller
Enter New Password
ArrowKey Or AZ:Move Cursor, Enter:Select, ESC:Escape, L:Line Draw, X:Redraw

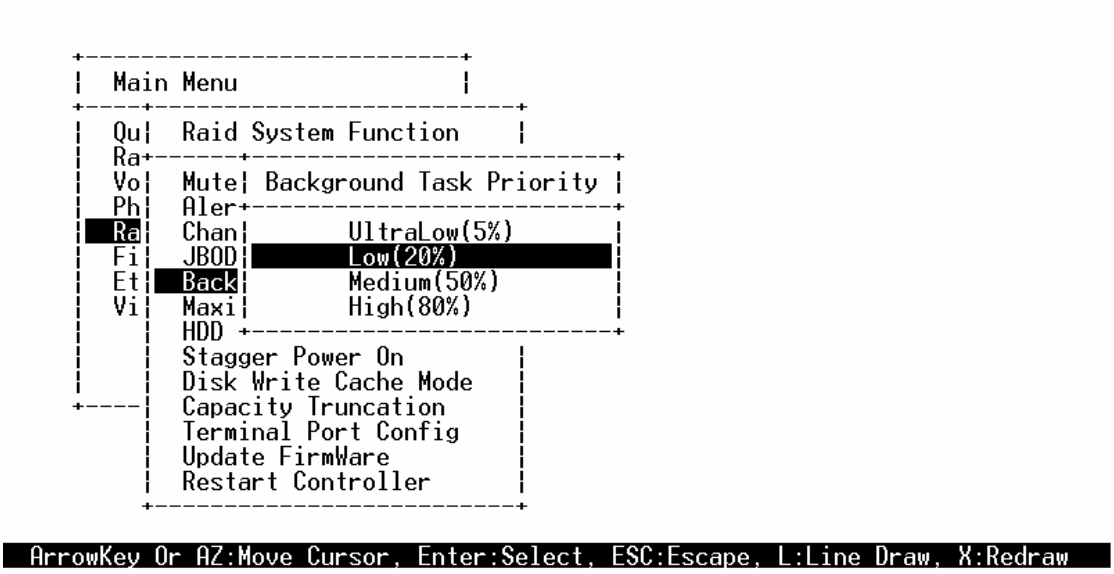
RAID/JBOD Function

This function allows users to choose between RAID or JBOD. Choose RAID, you can configure all RAID settings. Choose JBOD, all disks on DAS-315FA2 will be treated as “Just a Bunch of Disk”, allowing you to use all disks as a simple storage capacity. **However, before you choose JBOD, you should delete all previous RAID set.** A warning screen will appear if you do not erase all RAID set.



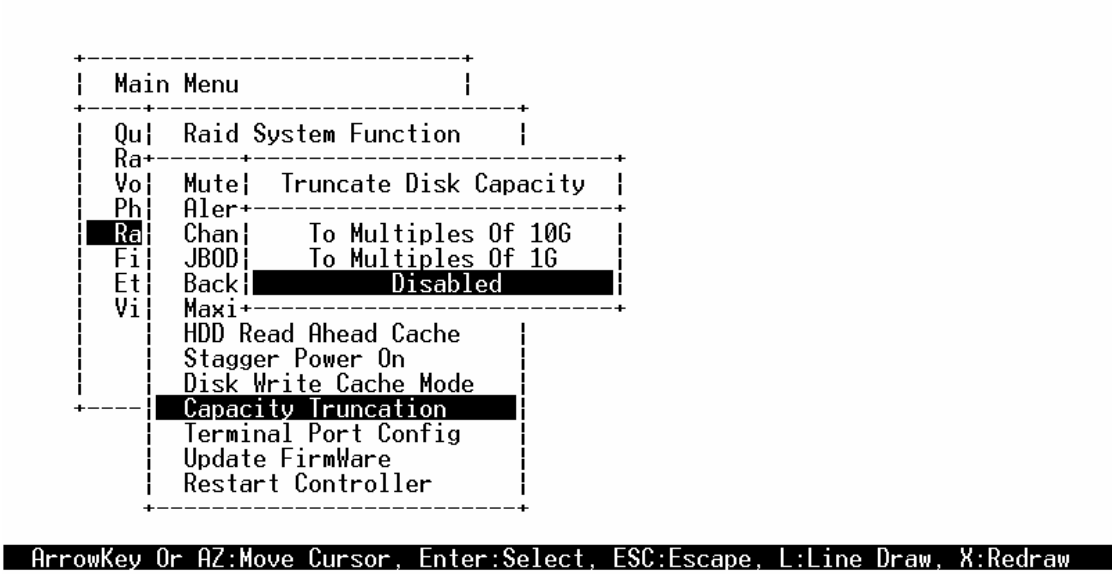
Background Task Priority

The **Background Task Priority** is a relative indication of how much time the controller devotes to a rebuild operation. The RAID subsystem allows user to choose the rebuild priority (low, normal, high) to balance volume set access and rebuild tasks appropriately.



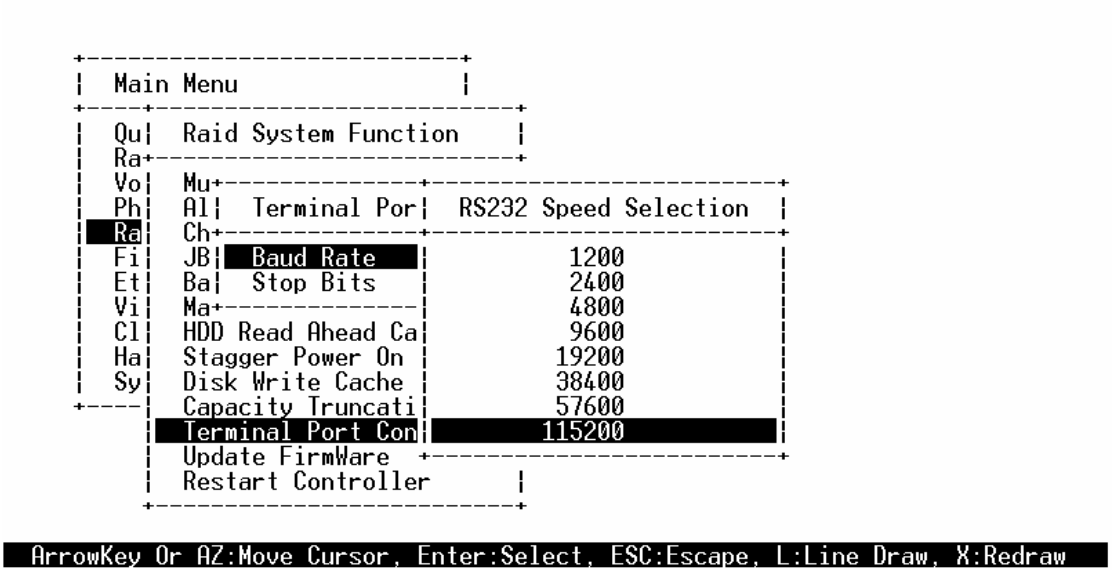
Capacity Truncation

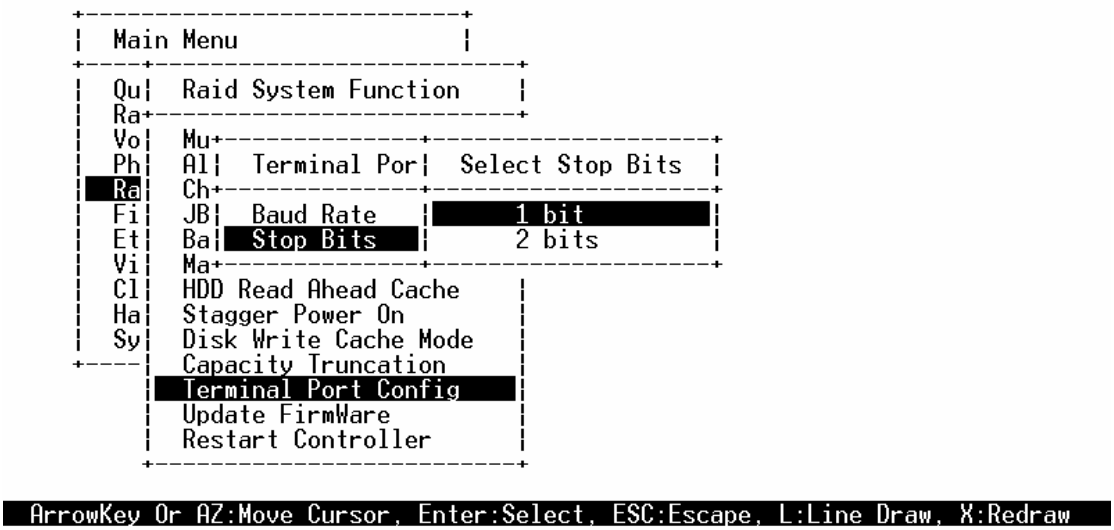
This function allows you to adjust the capacity of the hard disk for different branches, which may have similar, yet different disk drive capacities. You may use this function to adjust the capacity so that system can show the same capacity for the hard disks. You may select to cut **10G** or **1G** of each disk to adjust. You may decide not to use this function by selecting **Disabled.**



Terminal Port Configuration

This part allows you to configure terminal port settings, including **Baud Rate** and **Stop Bits**. Speed setting values for Baud Rate are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200. Stop Bit values are either 1 or 2 bits.





Update Firmware

Please reference the appendix B firmware utility for updating firmware.

Note:

1. The Bootable CD VT100 utility connected through the controller's serial port cannot support the update firmware feature.

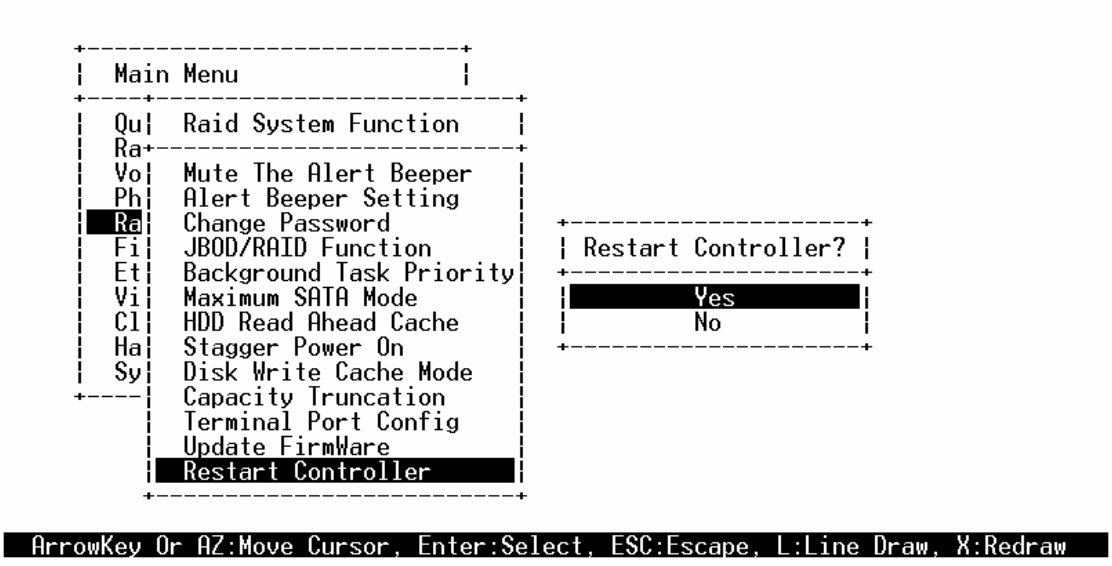
2. 2. User can update the firmware by VT100 terminal through the controller serial port or use WEB browser-base RAID management via HTTP proxy。

3. User can update the firmware by the firmware-embedded web browser-based RAID manager through the controller's 10/100 Ethernet LAN port.

Restart Controller

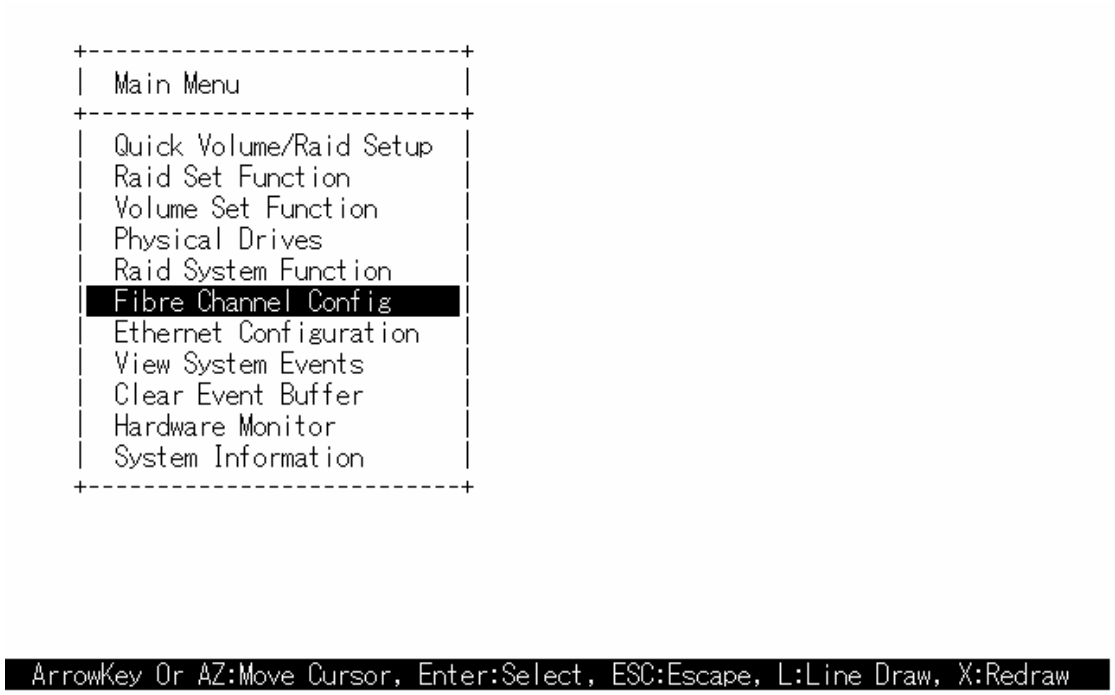
Use the Restart Controller Function to reset the entire configuration from the RAID subsystem controller non-volatile memory. To reset the controller, move the cursor bar to the Main menu Raid System Function item and then press the **Enter** key. The Raid System Function menu appears on the screen. Press **Enter** key to go into the Reset Controller item. The Reset Controller confirmation screen appears. Select **Yes** key to reset entire RAID system.

Note: It can only work properly at Host and Drive without any activity.



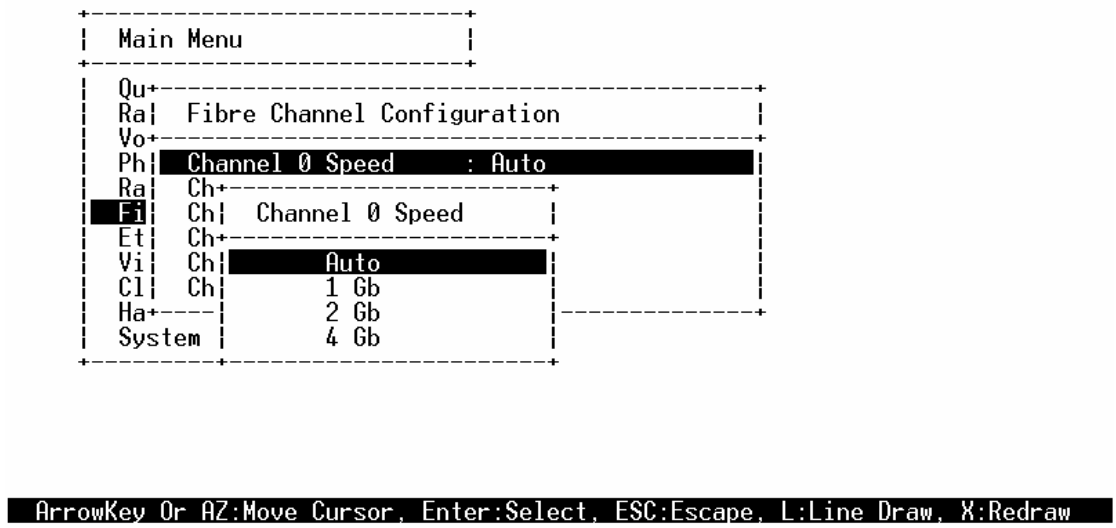
Fibre Channel Configuration

This function allows you to configure Fibre channel settings, including channel speed and channel topology.



Channel Speed

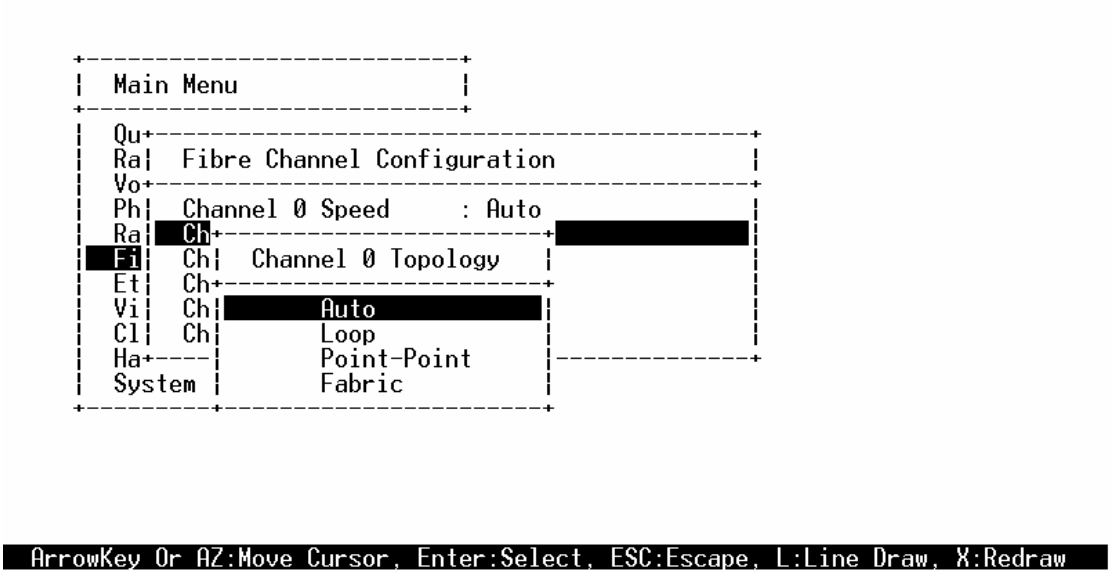
First select **Channel 0 Speed,** and then select among Auto, **1GB** to **4GB**.



Repeat the same procedure to configure **Channel 1 Speed**.

Channel Topology

Next, select **Channel Topology**, choose among **Auto**, **Loop**, and **Point-Point**.



Repeat the same procedure to configure Channel 1 Topology.

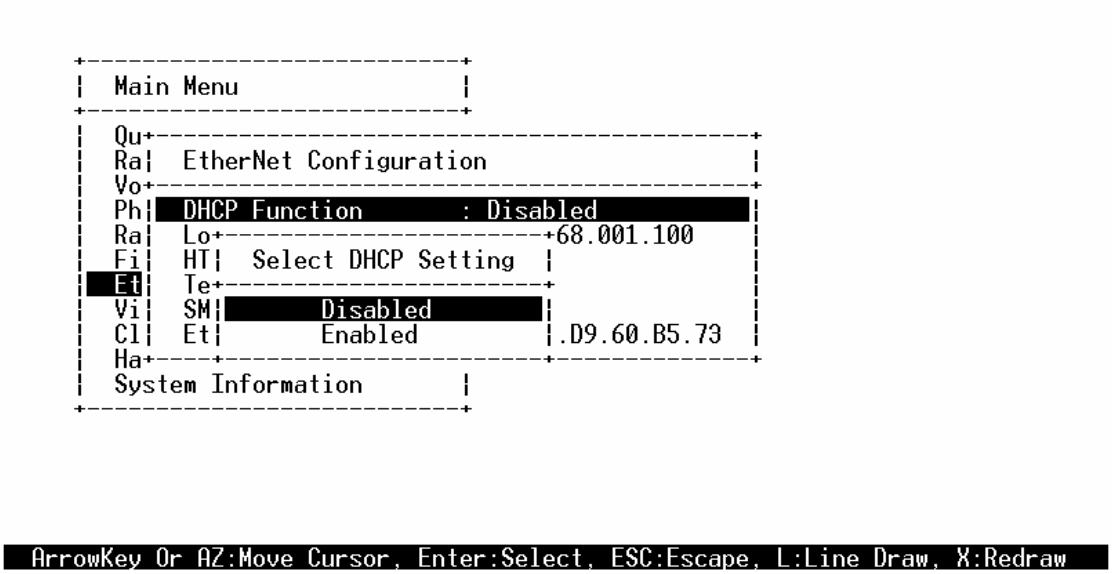
Ethernet Configuration

Use this feature to set the controller Ethernet port configuration. Customer doesn't need to create a reserved space on the arrays before the Ethernet port and HTTP service working.

DHCP Function

DHCP (Dynamic Host Configuration Protocol) is a protocol that lets network administrators manage centrally and automate the assignment of IP (Internet Protocol) configurations on a computer network. When using the Internet's set of protocols (TCP/IP), in order for a computer system to communicate to another computer system it needs a unique IP address. Without DHCP, the IP address must be entered manually at each computer system. DHCP lets a network administrator supervise and distribute IP addresses from a central point. The purpose of DHCP is to provide the automatic (dynamic) allocation of IP client configurations for a specific time period (called a lease period) and to eliminate the work necessary to administer a large IP network.

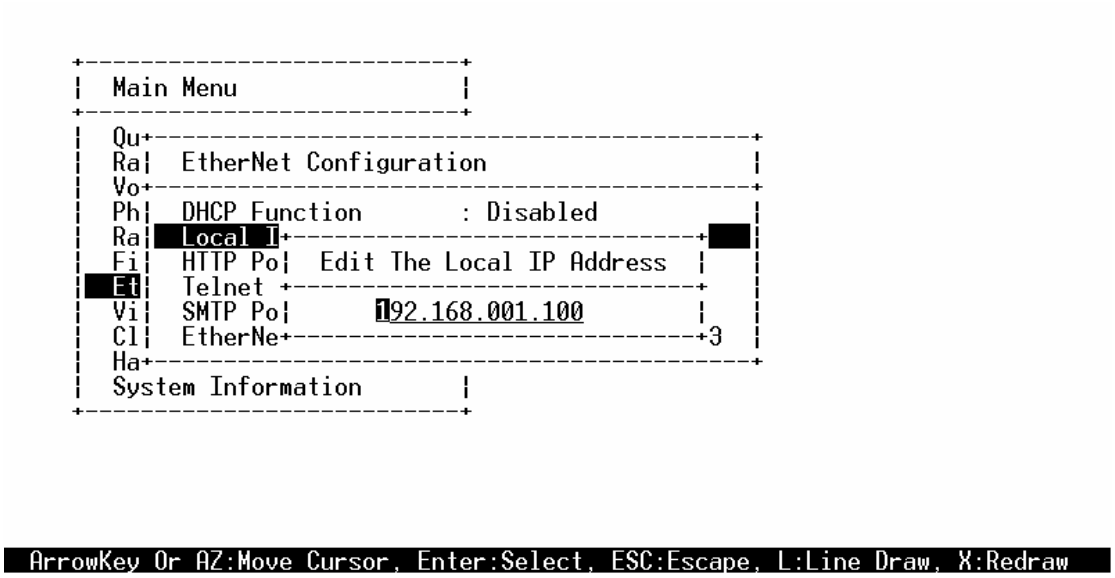
To manually configure the IP address of the controller, move the cursor bar to the Main menu Ethernet Configuration Function item and then press the **Enter** key. The Ethernet Configuration menu appears on the screen. Move the cursor bar to DHCP Function item, then press **Enter** key to show the DHCP setting. Select the "**Disabled**' or '**Enabled"** option to enable or disable the DHCP function.



Local IP address

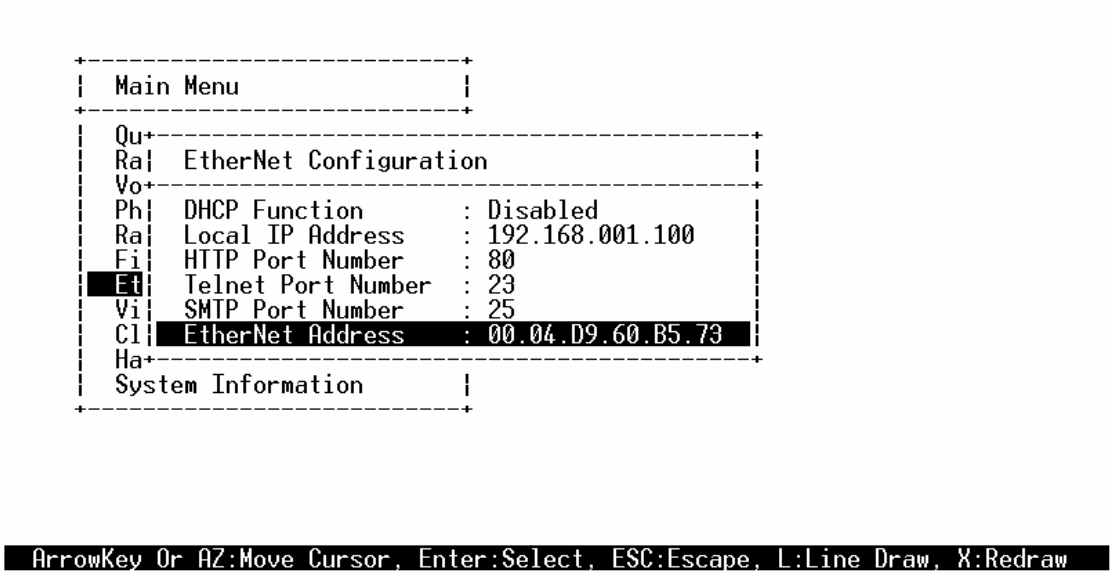
If you intend to set up your client computers manually, make sure that the assigned IP address is in the same range of your default router address and that it is unique to your private network. However we would highly recommend that if you have a network of computers and the option to assign your TCP/IP client configurations automatically, please do. An IP address allocation scheme will reduce the time it takes to set-up client computers and eliminate the possibilities of administrative errors.

To manually configure the IP address of the controller, move the cursor bar to the Main menu Ethernet Configuration Function item and then press the **Enter** key. The Ethernet Configuration menu appears on the screen. Move the cursor bar to Local IP Address item, then press **Enter** key to show the default address setting in the RAID controller. You can reassign the IP address of the controller.



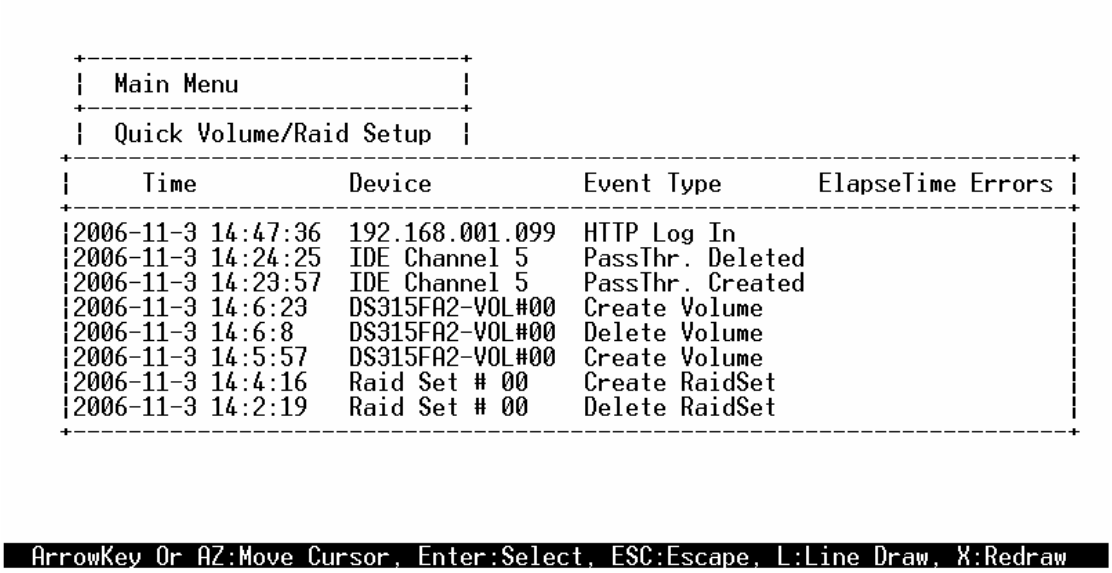
Ethernet Address

A MAC address stands for Media Access Control address and is your computer's unique hardware number. On an Ethernet LAN, it's the same as your Ethernet address. When you're connected to the Internet from the RAID controller Ethernet port, a correspondence table relates your IP address to the RAID controller’s physical (MAC) address on the LAN.


Main Menu
EtherNet Configuration
DHCP Function : Disabled
Local IP Address : 192.168.001.100
HTTP Port Number : 80
Telnet Port Number : 23
SMTP Port Number : 25
EtherNet Address : 00.04.D9.60.B5.73
System Information
ArrowKey Or AZ:Move Cursor, Enter:Select, ESC:Escape, L:Line Draw, X:Redraw

View System Events

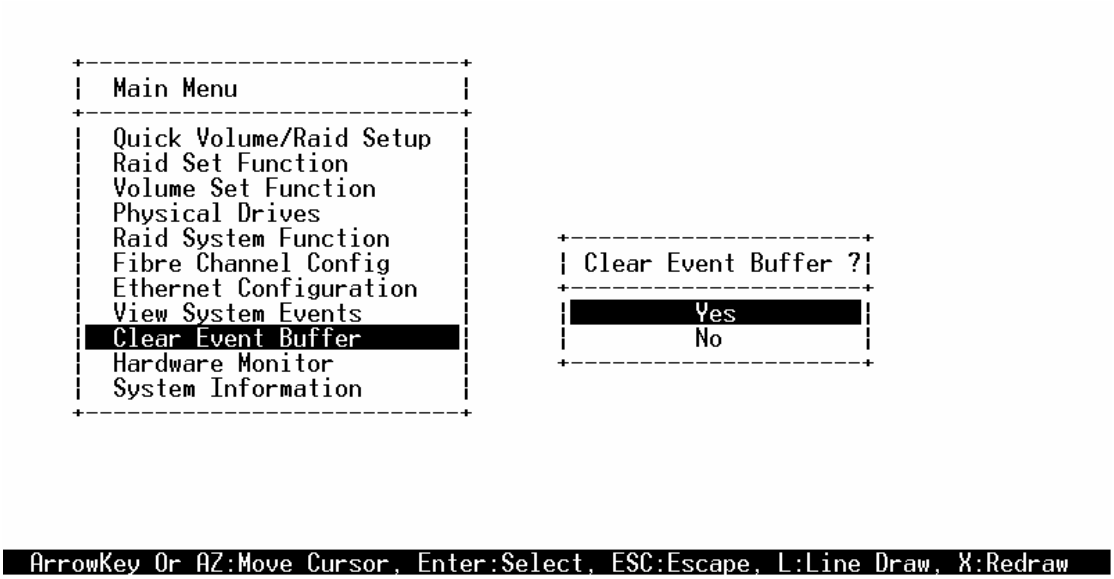
To view the RAID subsystem controller's system event information, move the cursor bar to the main menu and select the **View System Events** link, then press the **Enter** key The RAID subsystem events screen appear.


Main Menu
Quick Volume/Raid Setup
Time Device Event Type ElapseTime Errors
2006-11-3 14:47:36 192.168.001.099 HTTP Log In
2006-11-3 14:24:25 IDE Channel 5 PassThr. Deleted
2006-11-3 14:23:57 IDE Channel 5 PassThr. Created
2006-11-3 14:6:23 DS315FA2-VOL#00 Create Volume
2006-11-3 14:6:8 DS315FA2-VOL#00 Delete Volume
2006-11-3 14:5:57 DS315FA2-VOL#00 Create Volume
2006-11-3 14:4:16 Raid Set # 00 Create RaidSet
2006-11-3 14:2:19 Raid Set # 00 Delete RaidSet
ArrowKey Or AZ:Move Cursor, Enter:Select, ESC:Escape, L:Line Draw, X:Redraw

Choose this option to view the system events information: Time, Device, Event type, Elapse Time and Errors. The RAID system does not built the real time clock. The Time information is the relative time from the RAID subsystem power on.

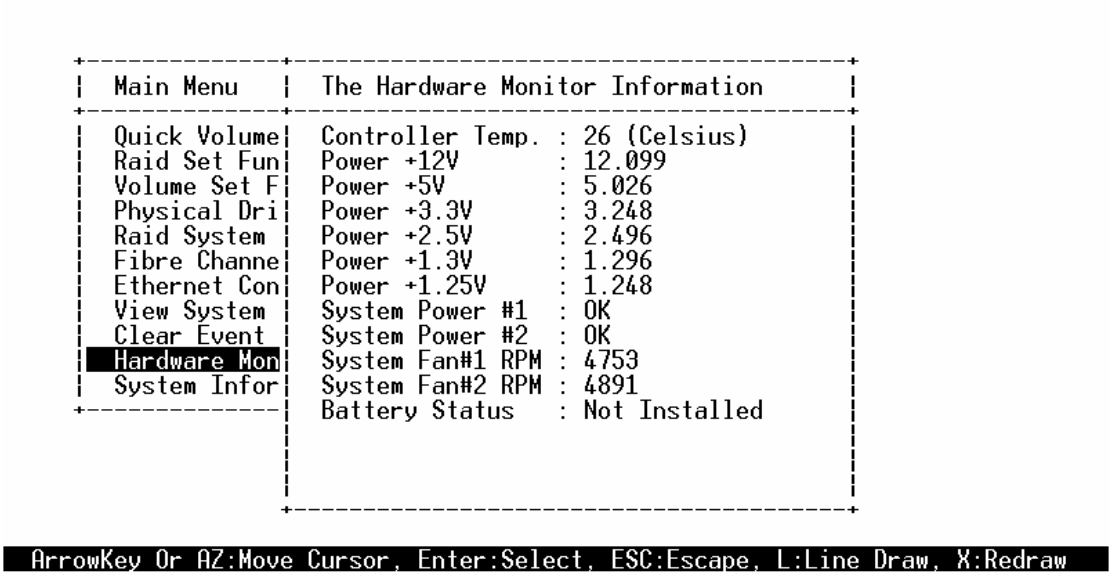
Clear Events Buffer

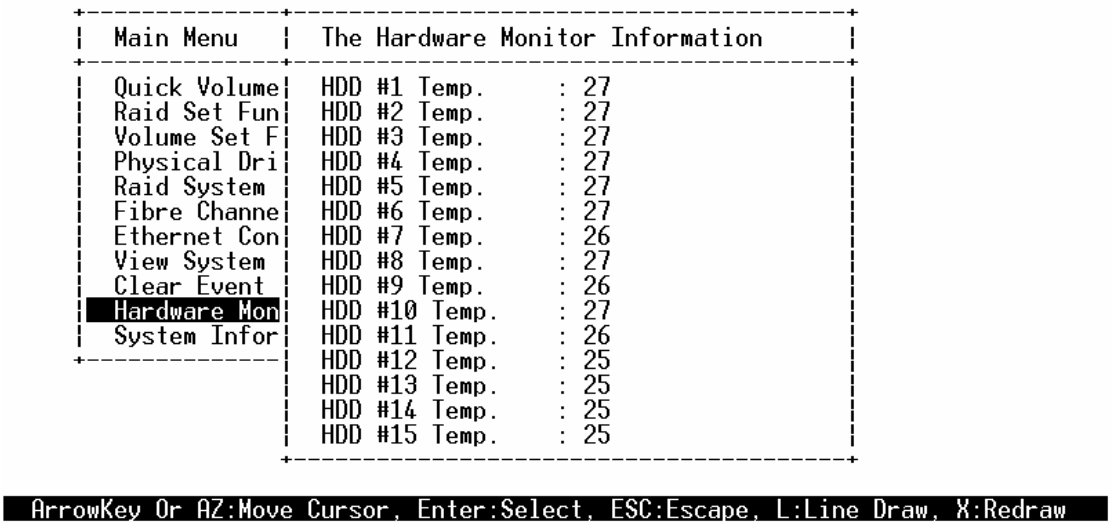
Use this feature to clear the entire events buffer information.



Hardware Monitor

The Hardware Monitor Information provides the temperature, fan speed (chassis fan) and voltage of the internal RAID subsystem. The temperature items list the current states of the controller board and backplane. All items are also unchangeable. The warning messages will indicate through the, LED and alarm buzzer.

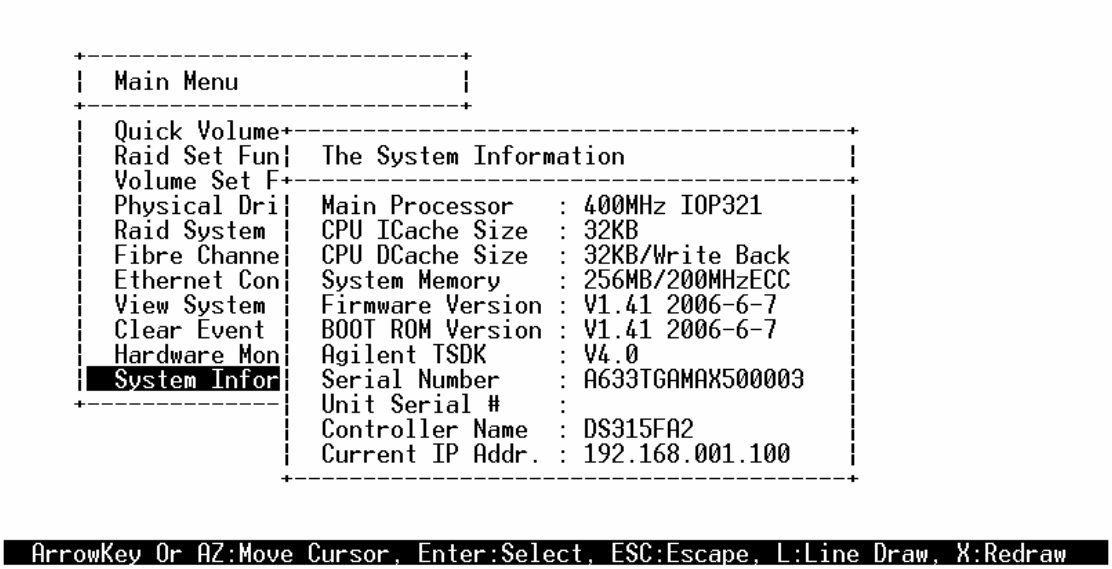




Item	Warning Condition
Controller Board Temperature	**> 50 Celsius**
Backplane Temperature	**> 50 Celsius**
Controller Fan Speed	**< 1900 RPM**
Power Supply +12V	**< 10.5V or > 13.5V**
Power Supply +5V	**< 4.7V or > 5.3V**
Power Supply +3.3V	**< 3.0V or > 3.6V**
CPU Core Voltage +1.5V	**< 1.35V or > 1.65V**

System Information

Choose this option to display Main processor, CPU Instruction cache and data cache size, firmware version, serial number, controller model name, and the cache memory size. To check the system information, move the cursor bar to **System Information** item, then press **Enter** key. All major controller system information will be displayed.



Chapter 4: Web Browser-based Configuration

The RAID subsystem web browser-based configuration utility is firmware-based and used to configure raid sets and volume sets. You may use this utility to:

· Create raid set,

. Expand raid set,

· Define volume set,

· Add physical drive,

· Modify volume set,

· Modify RAID level/stripe size,

· Define pass-through disk drives,

. Modify system function,

· Update firmware, and

· Designate drives as hot spares.

If you need to boot the operating system from a RAID system, you must first create a RAID volume by using front panel touch-control keypad, Bootable CD VT-100 utility at X86-based system, Web Browser through Ethernet LAN, or VT-100 terminal.

Firmware-embedded TCP/IP & web browser-based RAID manager (using the controller's 10/100 Ethernet LAN port)

To ensure proper communications between the RAID subsystem and Web browser-based RAID management, Please connect the RAID system Ethernet LAN port to any LAN switch port.

The controller has embedded the TCP/IP & Web Browser-based RAID manager in the firmware. User can remote manage the RAID system without

adding any user specific software (platform independent) via standard web browsers directly connected to the 10/100 Ethernet RJ45 LAN port.

To configure External RAID subsystem on a local or remote machine, you need to know its IP Address. The IP address will default show in the screen.

Launch your firmware-embedded TCP/IP & Web Browser-based RAID manager by entering http://[IP Address] in the web browser. The default IP Address is **192.168.1.100**, or you may change the IP Address in the terminal console.

Note that you must be logged in as administrator with local admin rights on the remote machine to remotely configure it. The RAID subsystem controller default User Name is "**admin**" and the Password is "**0000**".

Configuring Raid Sets and Volume Sets

You can configure raid sets and volume sets with web browser-based RAID manager using Quick Create automatically, or Raid Set/Volume Set Function manually configuration method. Each configuration method requires a different level of user input. The general flow of operations for raid set and volume set configuration is:

Step	Action
1	Designate hot spares/pass-through (optional).
2	Choose a configuration method.
3	Create raid sets using the available physical drives.
4	Define volume sets using the space in the raid set.
5	Initialize the volume sets (logical drives) and use volume sets in the host OS.

Designating Drives as Hot Spares

All unused disk drive that is not part of a raid set can be created as a Hot Spare. The Quick Create configuration will automatically add the spare disk drive with the raid level for user to select. For the Raid Set Function configuration, users can use the **Create Hot Spare** option to define the hot spare disk drive. Please refer to **Create Hot Spare** section.

Using Quick Volume /Raid Setup Configuration

In Quick Create Configuration, it collects all drives in the tray and includes them in a raid set. The raid set you create is associated with exactly one volume set, and you can modify the default RAID level, stripe size, and capacity of the volume set.

Designating Drives as Hot Spares will also show in the raid level selection option.

The volume set default settings will be:

Parameters	**Settings**
Volume Name	Volume Set #00
Fibre Channel/ ID/ LUN	0/0/0
Cache Mode	Write Back
Tag Queuing	Yes
Max Sync Rate	Depend on your host adapter setting

The default setting values can be changed after configuration is complete.

Follow the steps below to create arrays using **Quick Create** Configuration:

Step	**Action**
1	Choose **Quick Create** from the main menu. The available RAID levels with hot spare for the current volume set drive are displayed.
2	Try to use drives of the same capacity in a specific array. If you use drives with different capacities in an array, all the drives in the raid set is treated as though they have the capacity of the *smallest* drive in the raid set. The numbers of physical drives in a specific array determine the RAID levels that can be implemented with the array. RAID 0 requires one or more physical drives, RAID 1 requires at least 2 physical drives, RAID 1+Spare requires at least 3 physical drives, RAID 3 requires at least 3 physical drives, RAID 5 requires at least 3 physical drives. RAID 6 requires at least 4 physical drives. RAID 3 +Spare requires at least 4 physical drives, RAID 5 + Spare requires at least 4 physical drives, and RAID 6 + Spare requires at least 5 physical drives. Select ***RAID level*** for the volume set.
3	Set the capacity size for the current volume set.

4	Select the current volume set stripe size. This parameter specifies the size of the stripes written to each disk in a RAID 0, 1,0+1, 5 or 6 Volume Set. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB. A larger stripe size provides better-read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random read requests more often, choose a small stripe size.
5	When you are finished defining the volume set, press **Enter** key to confirm the Quick Volume And Raid Set Setup function.
6	*Select the Volume Initialization Mode.* In the Normal Initialization, the initialization proceeds as a background task, the volume set is fully accessible for system reads and writes. The operating system can instantly access to the newly created arrays without requiring a reboot and waiting the initialization complete. In Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
7	Initialize the volume set you have just configured.
8	If you need to add additional volume set, using main menu *Create Volume Set* function.

Using Raid Set/Volume Set Function Method

In Raid Set Function, you can use the **Create Raid Set** function to generate the new raid set. In Volume Set Function, you can use the **Create Volume Set** function to generate its associated volume set and parameters.

If the current controller has unused physical devices connected, you can choose the Create Hot Spare option in the Raid Set Function to define a global hot spare. Select this method to configure new raid sets and volume sets. The **Raid Set/Volume Set Function** configuration option allows you to associate volume set with partial and full raid set.

Step	Action
1	To setup the Hot Spare (option), choose ***Raid Set Function*** from the main menu. Select the **Create Hot Spare** and press **Enter** key to set the Hot Spare.
2	Choose ***Raid Set Function*** from the main menu. Select the **Create Raid et** and press **Enter** key **Set** and press **Enter** Key.
3	A Select IDE Drive For Raid Set window is displayed showing the IDE drive connected to the current controller.
4	Press the **UP** and **DOWN** arrow keys to select specific physical drives. Press the **Enter** key to associate the selected physical drive with the current raid set. Try to use drives of the same capacity in a specific raid set. If you use drives with different capacities in an array, all the drives in the array is treated as though they have the capacity of the smallest drive in the array. The numbers of physical drives in a specific raid set determine the RAID levels that can be implemented with the raid set. RAID 0 requires one or more physical drives per raid set.

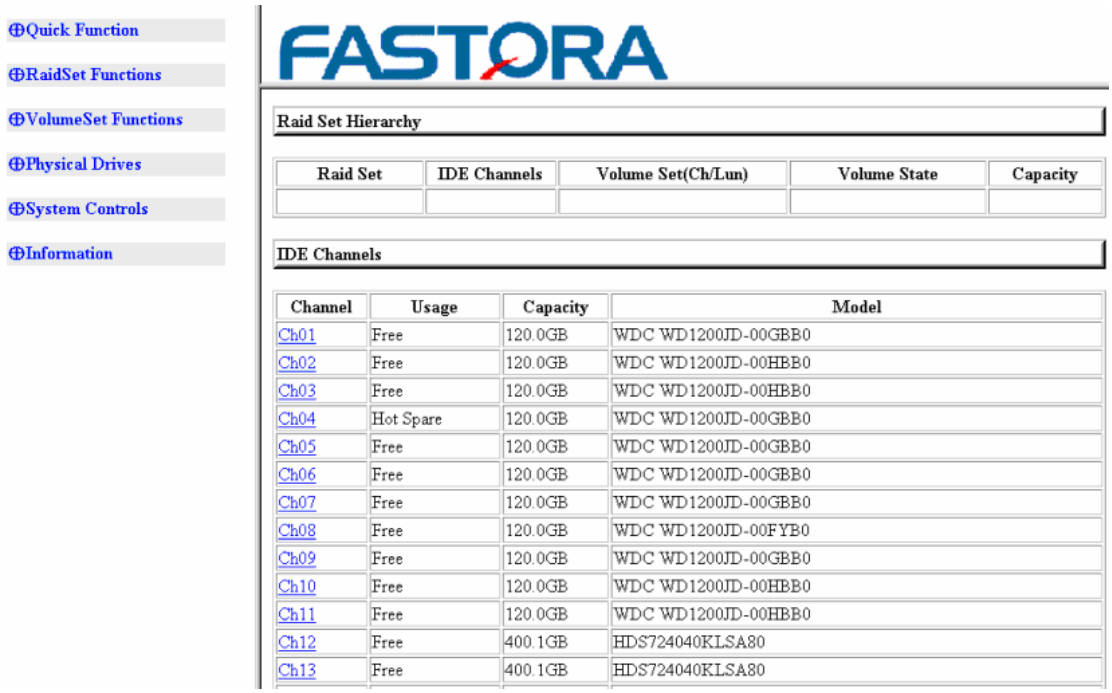
	RAID 1(0+1) requires at least 2 physical drives per raid set. RAID 3 requires at least 3 physical drives per raid set. RAID 5 requires at least 3 physical drives per raid set. RAID 6 requires at least 4 physical drives per raid set
5	An Edit The Raid Set Name dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #. Press **Enter** to finish the name editing.
6	After adding physical drives to the current raid set as desired, press **Yes** to confirm the Create Raid Set function.
7	An Edit The Raid Set Name dialog box appears. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #.
8	Press **Enter** key when you are finished creating the current raid set. To continue defining another raid set, repeat step 3. To begin volume set configuration, go to step 9
9	Choose **Volume Set Function** from the Main menu. Select the **Create** Volume Set and press Enter key.
10	Choose one raid set from the Create Volume From Raid Set window. Press **Enter** key to confirm it.
11	The Volume Creation screen shows the volume set default attribute values that are currently being configured. The attribute column headings are: The Raid Level, The Stripe Size, The Cache Mode, The Tagged Queuing,

	The Volume Name (number). The user can change all values After the current volume set attributes are defined, press **Esc** key to enter initialization selection screen.
12	*Fast Initialization* Press **Enter** key to define fast initialization and **Esc** key to normal initialization. In the Normal Initialization, the initialization proceeds as a background task, the volume set is fully accessible for system reads and writes. The operating system can instantly access to the newly created arrays without requiring a reboot and waiting the initialization complete. In Fast Initialization, the initialization proceeds must be completed before the volume set ready for system accesses.
13	If space remains in the raid set, the next volume set can be configured. Repeat steps 9 to 12 to configure another volume set.

Note: Users can use this method to examine the existing configuration. Modify volume set configuration method provides the same functions as create volume set configuration method. In volume set function, you can use the modify volume set function to modify the volume set parameters except the capacity size.

Configuring Raid Sets and Volume Sets

The web browser start-up screen will display the current configuration of your RAID subsystem. It displays the Raid Set List, Volume Set List and Physical Disk List. The raid set information, volume set information and drive information can also be viewed by clicking on the Raid Set Hierarchy screen. The current configuration can also be viewed by clicking on Raid Set Hierarchy in the menu.



To display raid set information, move the mouse cursor to the desired raid set number, then click it. The raid set Information will show in the screen.

To display volume set information, move the mouse cursor to the desired Volume Set number, then click it. The volume set Information will show in the screen. To display drive information, move the mouse cursor to the desired physical drive number, then click it. The drive Information will show in the screen.

Main Menu

The Main Menu shows all function that enables the customer to execute actions by clicking on the appropriate link.

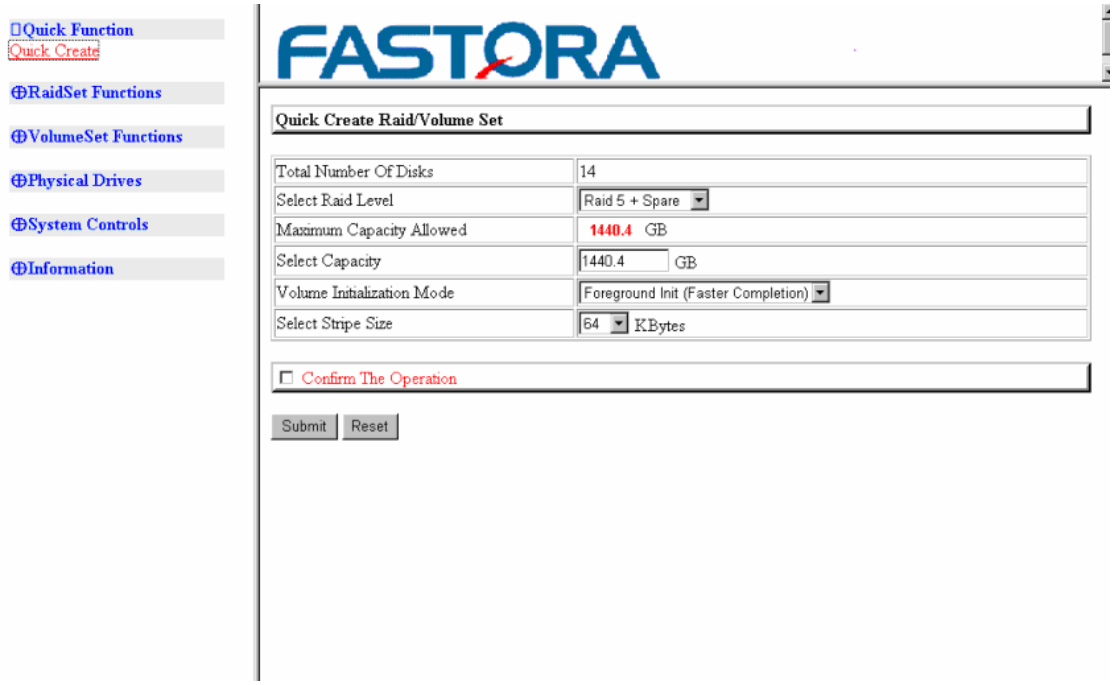
Individual Category	Description
Quick Function	Create a default configuration, which is based on the number of physical disk installed; it can modify the volume set Capacity, Raid Level, and Stripe Size.
Raid Set Functions	Create a customized raid set
Volume Set Functions	Create customized volume sets and modify the existed volume sets parameter.
Physical Drives	Create pass through disks and modify the existed pass through drives parameter. It also provides the function to identify the respect disk drive.
System Controls	Setting the raid system configurations
Information	View the controller and hardware monitor information. The Raid Set Hierarchy can also view through the Raid Set Hierarchy item.

Quick Create

The number of physical drives in the raid subsystem determines the RAID levels that can be implemented with the raid set. You can create a raid set associated with exactly one volume set. The user can change the raid level, stripe size, and capacity. A hot spare option is also created depending upon the existing configuration.

Check the **Confirm The Operation** and click on the **Submit** button in the Quick Create screen, the raid set and volume set will start to initialize.

Note: In Quick Create your volume set is automatically configured based on the number of disks in your system. Use the Raid Set Function and Volume Set Function if you prefer to customize your system.



Raid Set Functions

Use the Raid Set Function and Volume Set Function if you prefer to customize your system. User manual configuration can full control of the raid set setting, but it will take longer to complete than the Quick Volume/Raid Setup configuration. Select the Raid Set Function to manually configure the raid set for the first time or deletes existing raid set and reconfigures the raid set. A raid set is a group of disks containing one or more volume sets.

Create Raid Set

To create a raid set, click on the **Create Raid Set** link. A ***Select The SATA Drive For RAID Set*** screen is displayed showing the IDE drive connected to the current controller. Click on the selected physical drives with the current raid set. Enter 1 to 15 alphanumeric characters to define a unique identifier for a raid set. The default raid set name will always appear as Raid Set. #.

Check the **Confirm The Operation** and click on the **Submit** button in the screen, the raid set will start to initialize.

Delete Raid Set

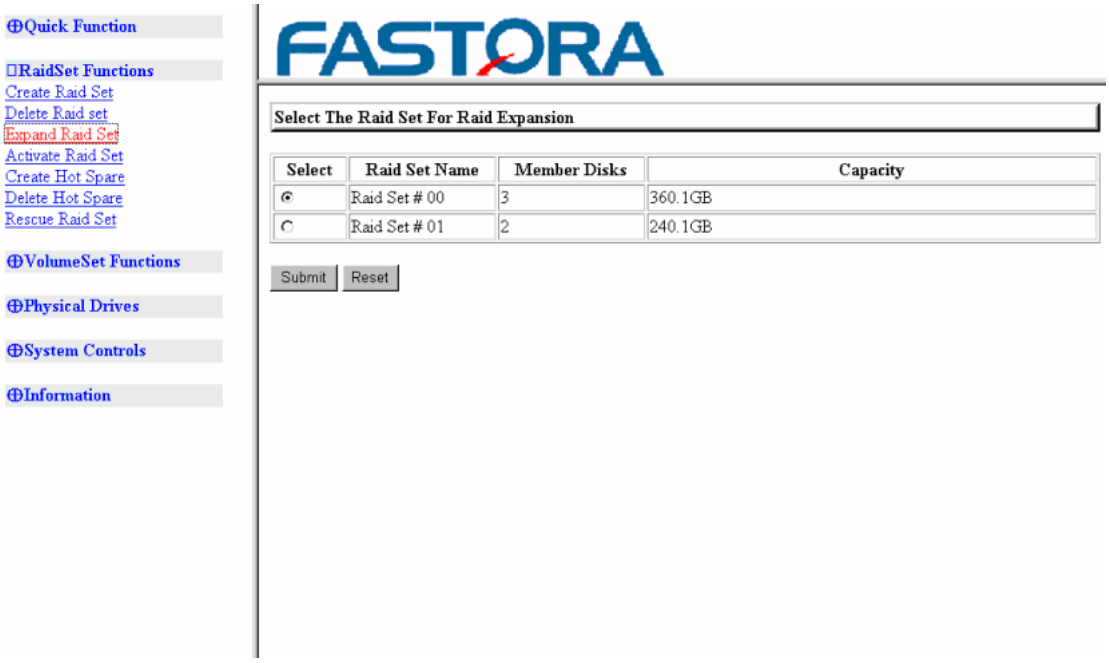
To delete a raid set, click on the **Delete Raid Set** link**.** A ***Select The RAID SET To Delete*** *screen* is displayed showing all raid set existing in the current controller. Click the raid set number you which to delete in the select column to delete screen. Check the **Confirm The Operation** and click on the **Submit** button in the screen to delete it.

Expand Raid Set

Use this option to expand a raid set, when a disk is added to your system. This function is active when at least one drive is available.

To expand a raid set, click on the **Expand Raid Set** link. Select the target raid set, which you want to expand it.

Select the available disk and check **Confirm The Operation**, and then click on the **Submit** button in the screen to add disks to the raid set.

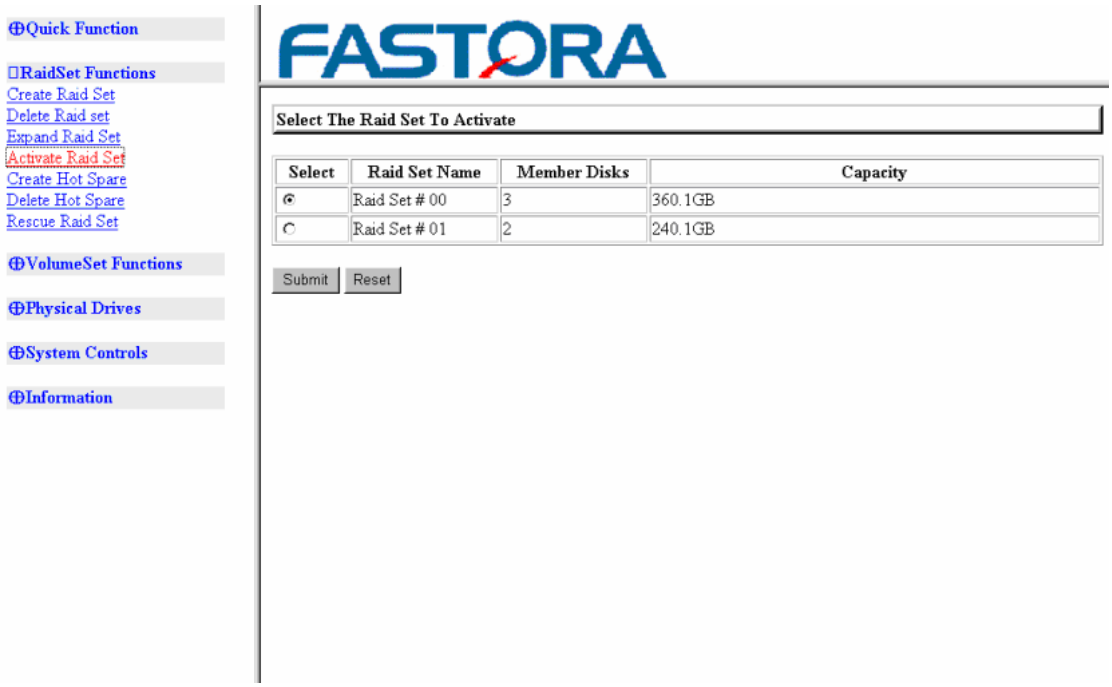


Activate Incomplete Raid Set

When one of the disk drive is removed in power off state, the raid set state will change to Incomplete State. If users want to continue to work when the RAID subsystem is power on, users can use the Activate Raid Set option to active the raid set. After user complete the function, the Raid State will change to Degraded Mode.

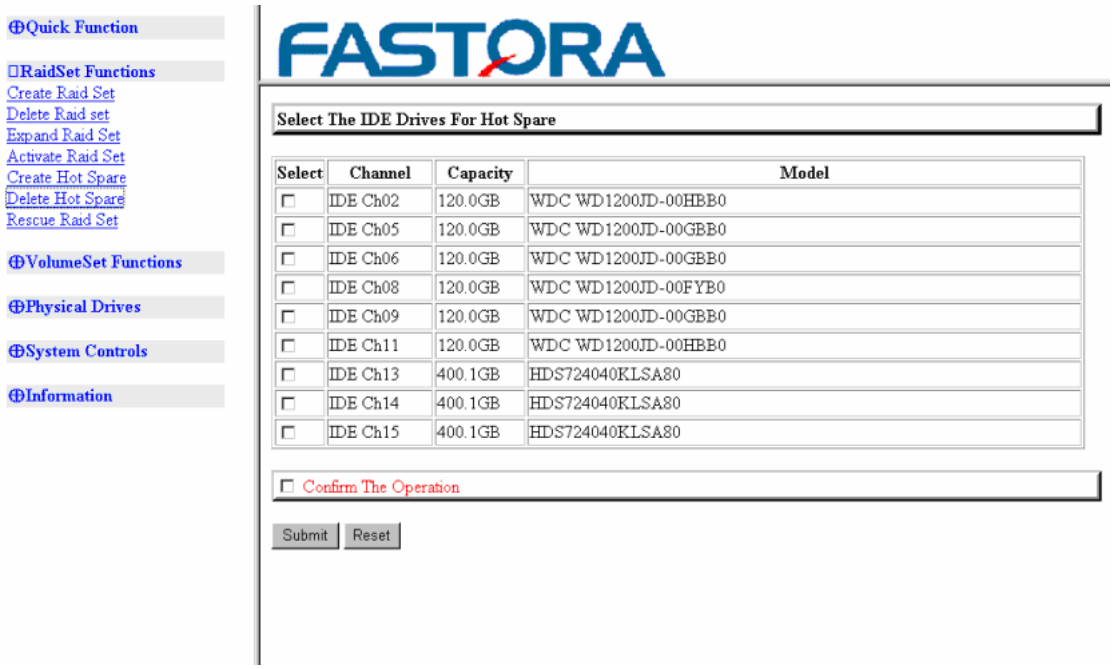
To activate the incomplete the raid set, click the **Activate Raid Set** link**.** A "*Select The RAID SET To Activate" screen* is displayed showing all raid set existing in the current controller. Click the raid set number you which to activate in the select column.

Click the **Submit** button in the screen to activate the raid set that has removed one of disk drive in the power off state. The RAID subsystem will continue to work in degraded mode.



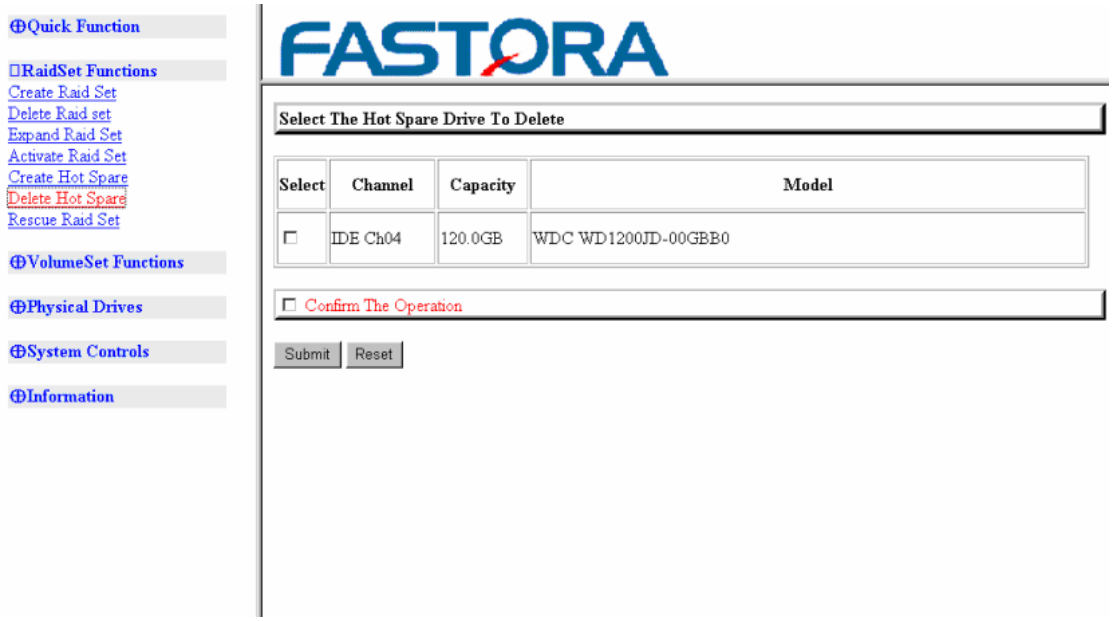
Create Hot Spare

When you choose the **Create Hot Spare** option in the Raid Set Function, all unused physical devices connected to the current controller appear: Select the target disk by clicking on the appropriate check box. Select the **Confirm The Operation**, and click on the **Submit** button in the screen to create the hot spares. The create Hot Spare option gives you the ability to define a global hot spare.



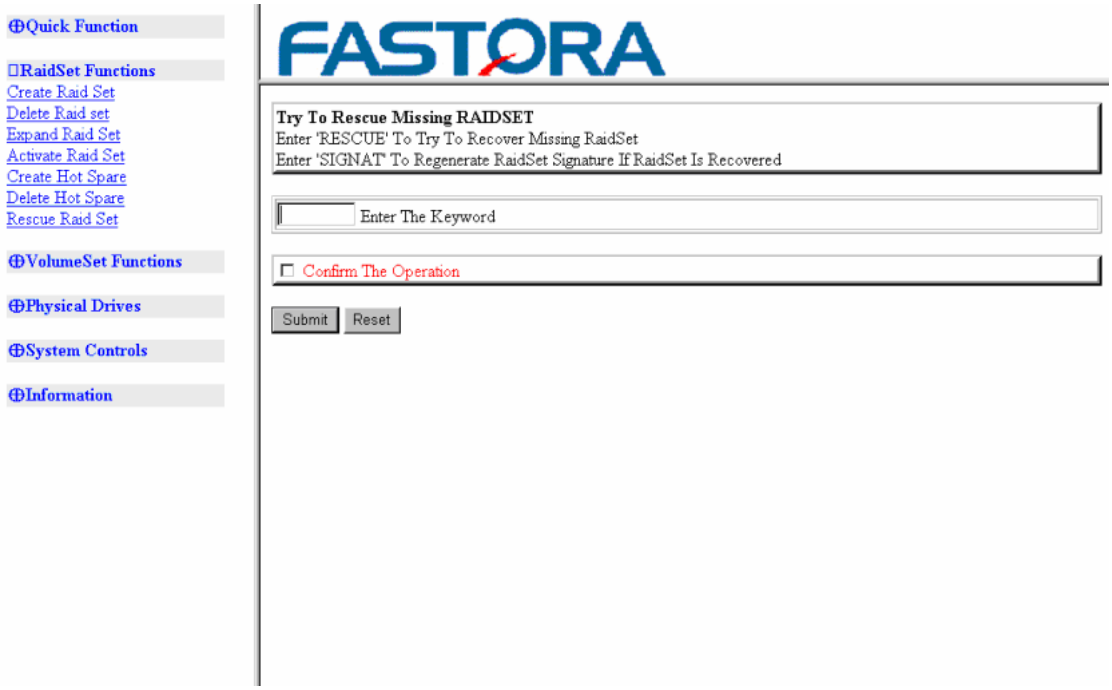
Delete Hot Spare

Select the target Hot Spare disk to delete by clicking the appropriate check box. Check the **Confirm The Operation**, and click the **Submit** button in the screen to delete the hot spares.



Rescue Raid Set

This function allows you to rescue the missing Raid Set by entering **RESCUE**. When Raid set is recovered, type SIGNAT to regenerate Raid Set signature.



Volume Set Function

A volume set is seen by the host system as a single logical device. It is organized in a RAID level with one or more physical disks. RAID level refers to the level of data performance and protection of a volume set. A volume set capacity can consume all or a portion of the disk capacity available in a raid set. Multiple volume sets can exist on a group of disks in a raid set**.** Additional volume sets created in a specified raid set will reside on all the physical disks in the raid set. Thus each volume set on the raid set will have its data spread evenly across all the disks in the raid set.

Create Volume Set

The following is the volume set features for the DAS-315FA2

1. Volume sets of different RAID levels may coexist on the same raid set.

2. Up to 16 volume sets can be created in a raid set.

3. The maximum addressable size of a single volume set is 2 TB.

To create volume set from raid set system, move the cursor bar to the main menu and click on the **Create Volume Set** link. The **Select The Raid Set To Create On It** screen will show all raid set number. **Tick** on a raid set number that you want to create and then **click** on the Submit button.

The new create volume set allows user to select the Volume name, RAID level, strip size, Fibre Channel LUN and Base LUN, and tag queuing, etc.

Volume Name:

The default volume name will always appear as Volume Set. #. You can rename the volume set name providing it does not exceed the 16 characters limit.

Member Disks:

System will allocate a number for the disk.

Volume Raid Level:

Set the RAID level for the Volume Set. Highlight *Raid Level* and press **Enter**. The available RAID levels for the current Volume Set are displayed. Select a RAID level and press **Enter** to confirm.

Max Capacity Allowed:

Read the default capacity, which is the maximal capacity for the Raid level.

Select Volume Capacity:

Enter the appropriate volume size to fit your application.

Volume Initialization Mode:

Select between **Foreground** or **Background** Initialization Mode.

Volume Stripe Size:

This parameter sets the size of the stripe written to each disk in a RAID 0, 1, 0+1, 5 or 6 logical drive. You can set the stripe size to 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB.

A larger stripe size produces better-read performance, especially if your computer does mostly sequential reads. However, if you are sure that your computer does random reads more often, select a small stripe size

Note: RAID level 3 can’t modify the stripe size.

Volume Cache Mode:

The RAID subsystem supports Write-Through Cache and Write-Back Cache.

Tag Command Queuing:

The Enabled option is useful for enhancing overall system performance under multitasking operating systems. The Command Tag (Drive Channel) function controls the SCSI command tag queuing support for each drive channel. This function should normally remain enabled. Disable this function only when using older SCSI drives that do not support command tag queuing.

Fibre Channel : LUN Base : LUN

Fibre Channel: The RAID subsystem supports two Fibre Channels. Choose the Fibre Channel numbers between 1 and 128

LUN Base: Choose the LUN Base number from the field.

LUN: Choose the LUN number from the field.

Delete Volume Set

To delete Volume from raid set system function, move the cursor bar to the main menu and click on the **Delete Volume Set** link. The **Select The Raid Set To Delete** screen will show all raid set number. **Select** a raid set number and check the **Confirm The Operation** and then **click** on the Submit button to show all volume set item in the selected raid set. Select a volume set number check the **Confirm The Operation** and then **click** on the **Submit** button to delete the volume set.

Modify Volume Set

To modify a volume set from a raid set:

(1). Click the **Modify Volume Set** link.

(2). Select volume set from the list that you wish to modify. The following screen appears.

Use this option to modify volume set configuration. To modify volume set attribute values from raid set system function, move the cursor bar to the volume set attribute menu and click on it. The modify value screen appears. Move the cursor bar to an attribute item, and then click on the attribute to modify the value. After you complete the modification, tick on the **Confirm The Operation** and click on the **Submit** button to complete the action. User can modify all values except the capacity.

Volume Set Migration

Migrating occurs when a volume set is migrating from one RAID level to another, a volume set strip size changes, or when a disk is added to a raid set. Migration status is displayed in the volume status area of the Raid Set Hierarchy screen when one RAID level to another, a Volume set strip size changes or when a disk is added to a raid set.

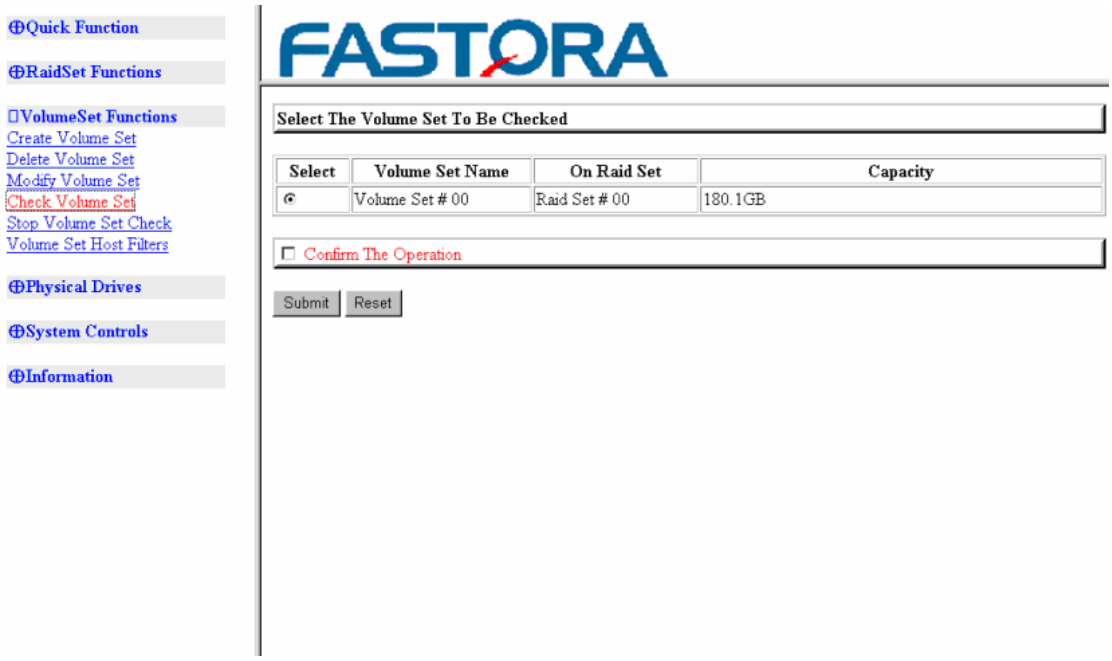
Check Volume Set

To check a volume set from a raid set:

(1). Click the **Check Volume Set** link.

(2). Select the volume set from the list that you wish to check. Check **Confirm The Operation** and click the **Submit** button.

Use this option to verify the correctness pf the redundant data in a volume set. For example, in a system with dedicated parity, volume set check means computing the parity of the data disk drives and comparing the results to the contents of the dedicated parity disk drive. The checking percentage can also be viewed by clicking on Raid Set Hierarchy in the main menu.



Stop Volume Set Check

Use this option to stop the Check Volume Set function. Check **Confirm The Operation**, and then click on **Submit** to stop volume set check.

Volume Set Host Filters

This function allows users to set host filter. Click on **Volume Set Host Filters** to view the main menu. You may add or delete the host entry if you have previously set the filter entry.

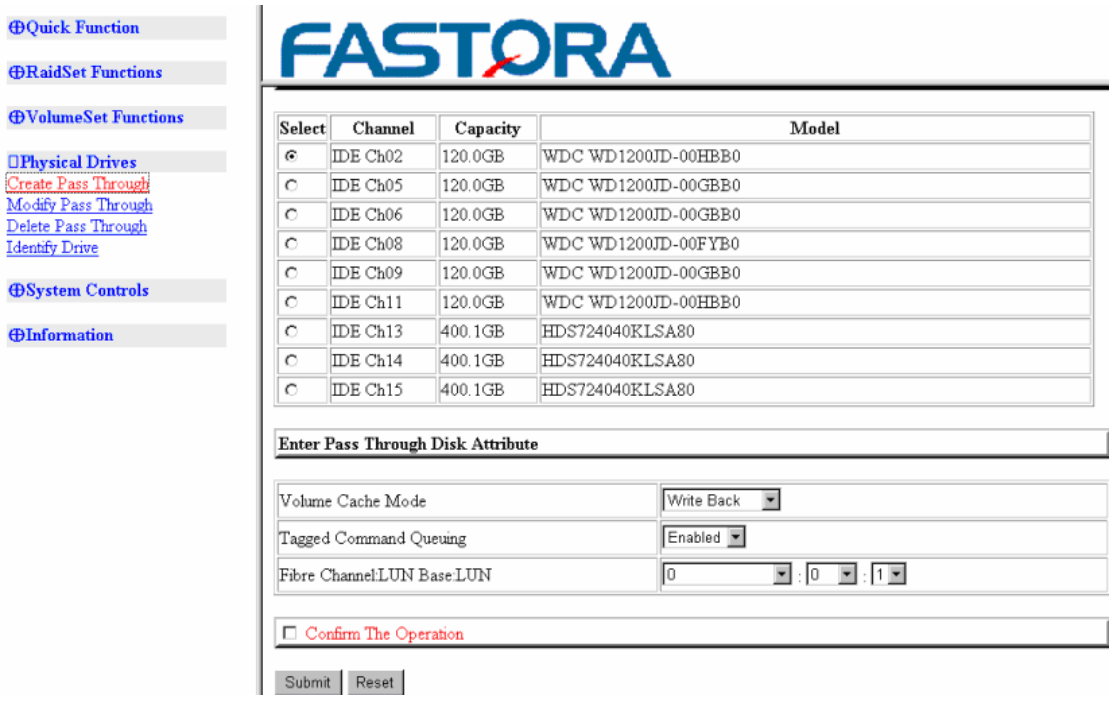
Please configure **Host WWN, Range Mask, Filter Type** and **Access Mode to add the Host Filter**. When finished, check Confirm the Operation and then click on **Submit** to complete.

Physical Drive

Choose this option from the Main Menu to select a physical disk and to perform the operations listed below.

Create Pass-Through Disk

To create pass-through disk, move the mouse cursor to the main menu and click the Create Pass-Through link. The relative setting function screen appears. Disk is no controlled by the internal RAID subsystem firmware and thus cannot be a part of a volume set. The disk is available to the operating system as an individual disk. It is typically used on a system where the operating system is on a disk not controlled by the RAID firmware. User can also select the cache mode, Tagged Command Queuing, Max Fibre speed and Fibre channel/Fibre_Loop_ID/LUN for this volume.



Modify Pass-Through Disk

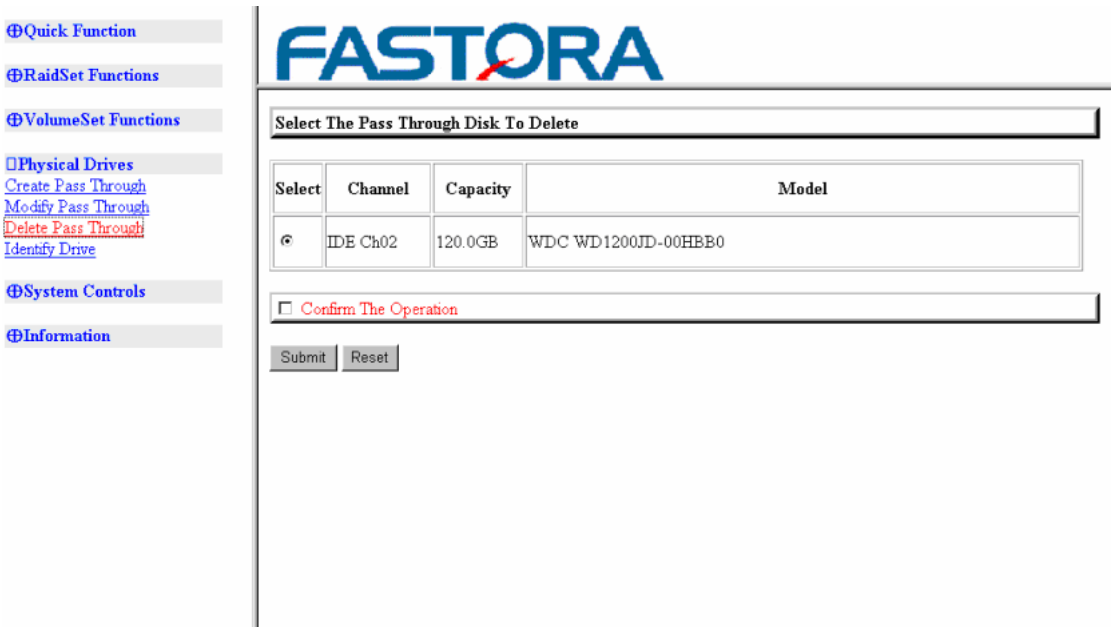
Use this option to modify the Pass-Through Disk Attribute. User can modify the cache mode, Tagged Command Queuing, Max SCSI speed and SCSI channel/ID/LUN on an existed pass through disk.

To modify the pass-through drive attribute from the pass-through drive pool, move the mouse cursor bar to click **Modify Pass-Through** link. The Select The Pass Through Disk For Modification screen appears, select Pass-Through Disk from the pass-through drive pool and click the **Submit** button to select drive. The Enter Pass-Through Disk Attribute screen appears, so you can modify the drive attribute values as you wish.

After you complete the selection, check **Confirm The Operation** and click on the **Submit** button to complete the selection action.

Delete Pass-Through Disk

To delete pass-through drive from the pass-through drive pool, move the mouse cursor bar to the main menus and click on **Delete Pass Through** link. After you complete the selection, check **Confirm The Operation** and click the **Submit** button to complete the delete action.

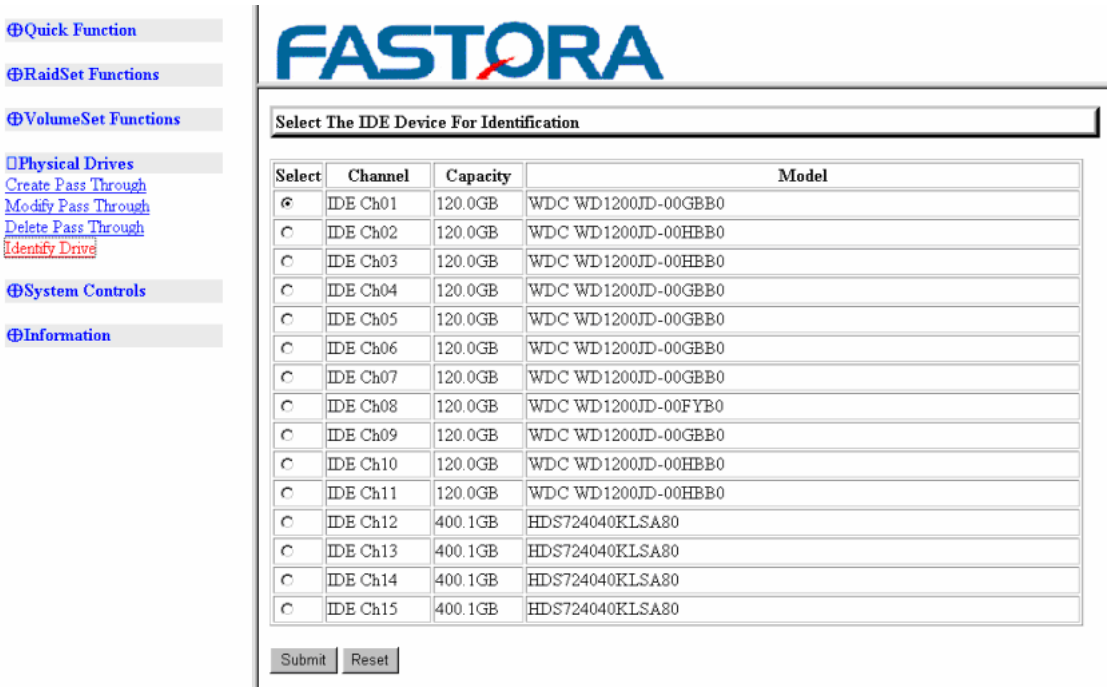


Identify Drive

To prevent removing the wrong drive, the selected disk LED will light for physically locating the selected disk when the *Identify Selected Drive* is selected.

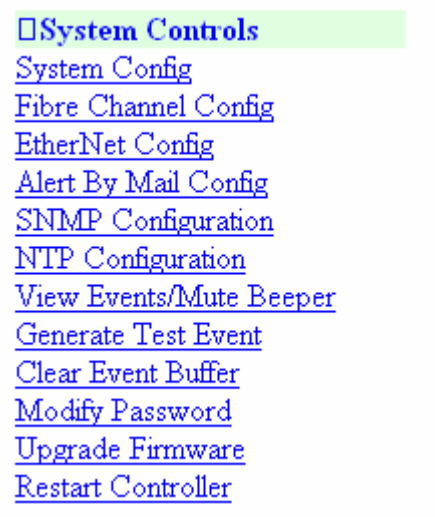
To identify the selected drive from the drives pool, move the mouse cursor bar to click **Identify Drive** link. The **Select The IDE Device For Identification** screen appears, then select the SATA device from the drives pool and Flash method.

After completing the selection, click on the **Submit** button to identify selected drive.



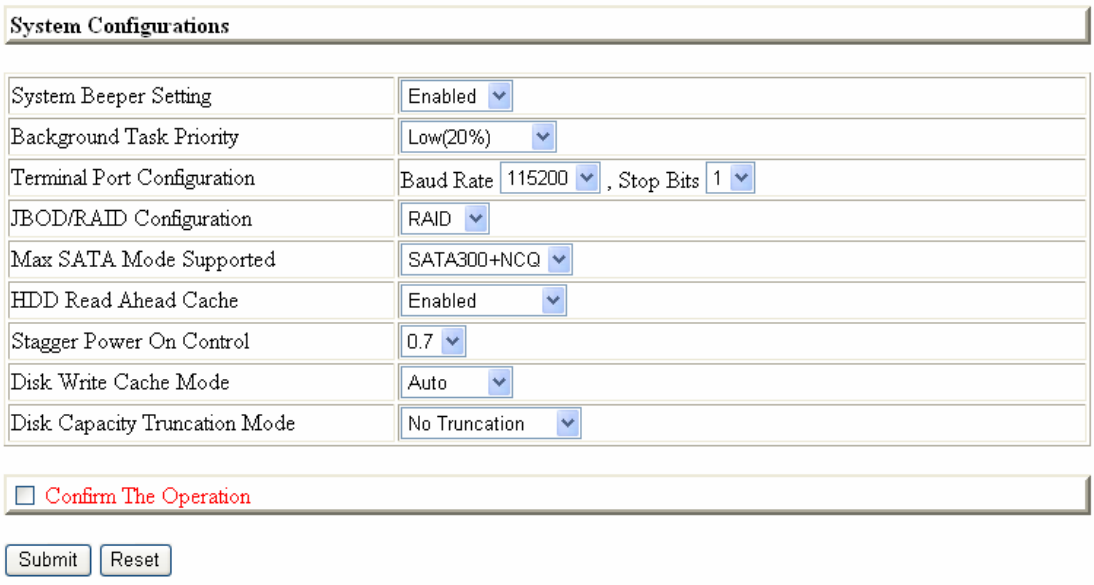
System Controls

This part allows you to configure systems configurations, including Fibre Channel configuration, Ethernet configuration, etc. Follow the descriptions below to configure the required settings.



System Configuration

Click on **System Config** link and configure the following settings:



System Beeper Setting:

The Alert Beeper function item is used to Disabled or Enable the RAID subsystem controller alarm tone generator.

RAID Rebuild Priority:

The Raid Rebuild Priority is a relative indication of how much time the controller devotes to a rebuild operation. The RAID subsystem allows user to choose the rebuild priority (Low, Normal, High) to balance volume set access and rebuild tasks appropriately. For high array performance, specify a Low value.

Terminal Port Configuration:

Speed setting values are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200.

Stop Bits values are 1 bit and 2 bits.

Note: Parity value is fixed at None.

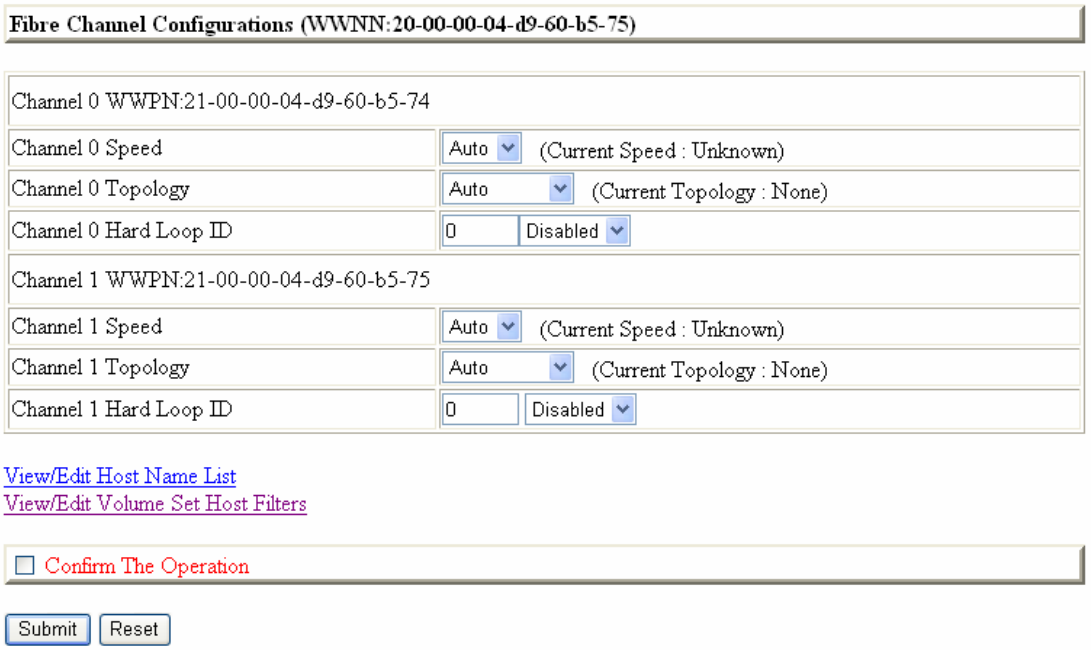
Data Bits value is fixed at 8 bits.

JBOD/RAID Configuration:

Select JBOD or RAID for your DAS-315FA2 Disk Array.

Fibre Channel Configuration

This function allows you to configure Fibre Channel settings. As DAS-315FA2 offers two Fibre Channels, please configure Channel 0 and Channel 1 in the related fields for speed, topology and hard loop ID.



Ethernet Configuration

Use this feature to set the controller Ethernet port configuration. Customer does not need to create a reserved space on the arrays before the Ethernet port and HTTP service working. The firmware-embedded Web Browser-based RAID manager can access it from any standard internet browser or from any host computer either directly connected or via a LAN or WAN with no software or patches required. DHCP (Dynamic Host Configuration Protocol) is a protocol that lets network administrators manage centrally and automate the assignment of IP (Internet Protocol) configurations on a computer network. When using the Internet's set of protocols (TCP/IP), in order for a computer system to communicate to another computer system it needs a unique IP address. Without DHCP, the IP address must be entered manually at each computer system. DHCP lets a network administrator supervise and distribute IP addresses from a central point. The purpose of DHCP is to provide the automatic (dynamic) allocation of IP client configurations for a specific time period (called a lease period) and to eliminate the work necessary to administer a large IP network.

To configure the raid controller EtherNet port, move the cursor bar to the main menu and click the **System Controls** link. The **System Controls** menu will show all items. Move the cursor bar to the **EtherNet Config** item, then press **Enter** key to select the desired function.

Ether Net Configurations

DHCP Function	Disabled
Local IP Address (Used If DHCP Disabled)	192 . 168 . 1 . 100
Gateway IP Address (Used If DHCP Disabled)	192 . 168 . 1 . 1
Subnet Mask (Used If DHCP Disabled)	255 . 255 . 255 . 0
HTTP Port Number (7168..8191 Is Reserved)	80
Telnet Port Number (7168..8191 Is Reserved)	23
SMTP Port Number (7168..8191 Is Reserved)	25
Current IP Address	192.168.1.100
Current Gateway IP Address	192.168.1.1
Current Subnet Mask	255.255.255.0
Ether Net MAC Address	00.04.D9.60.B5.73

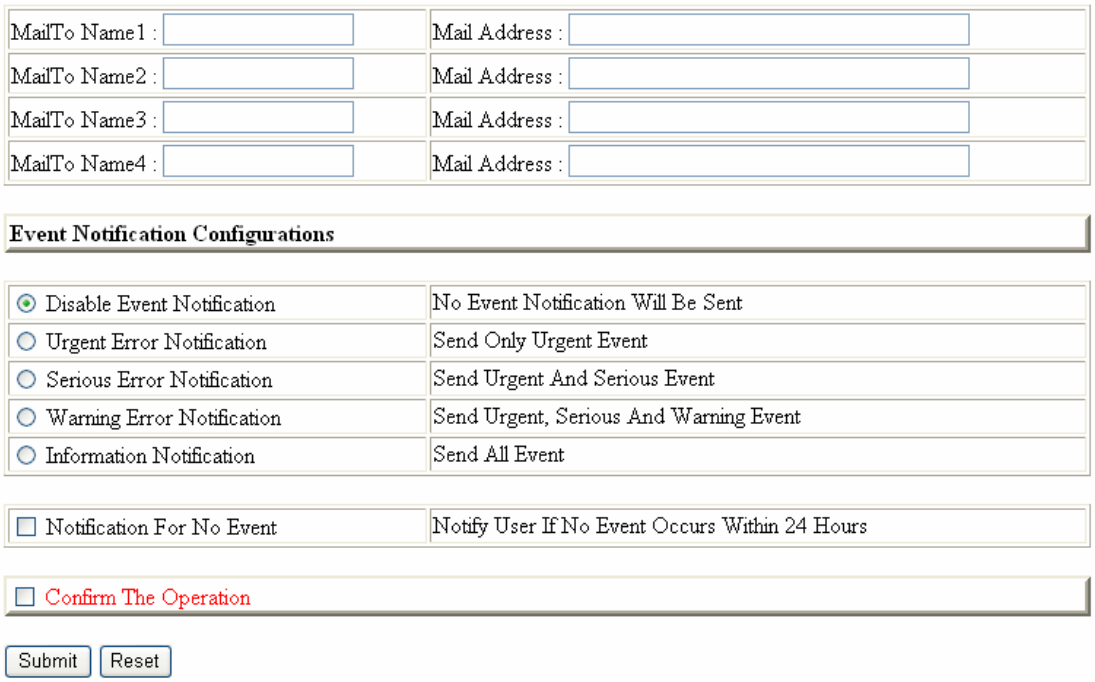
☐ Confirm The Operation

Submit Reset

Alert By Mail Configuration

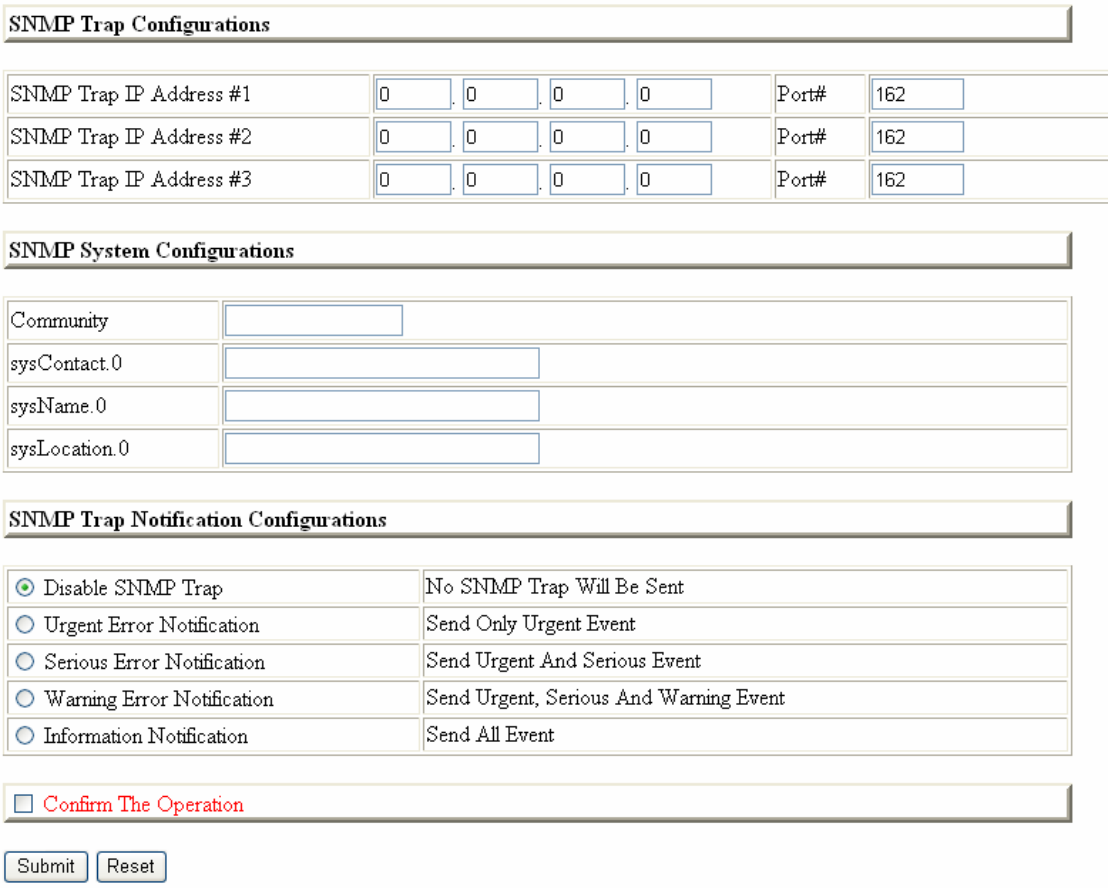
To configure the raid controller email function, move the cursor bar to the main menu and click on the **System Controls** link. The **System Controls** menu will show all items. Move the cursor bar to the **Alert By Mail Config** item, then press **Enter** key to select the desired function. This function can only be set by the web-based configuration.

The firmware contains SMTP manager monitors all system events and user can select either single or multiple user notifications to be sent via ‘ Plain English’ e-mails with no software required.



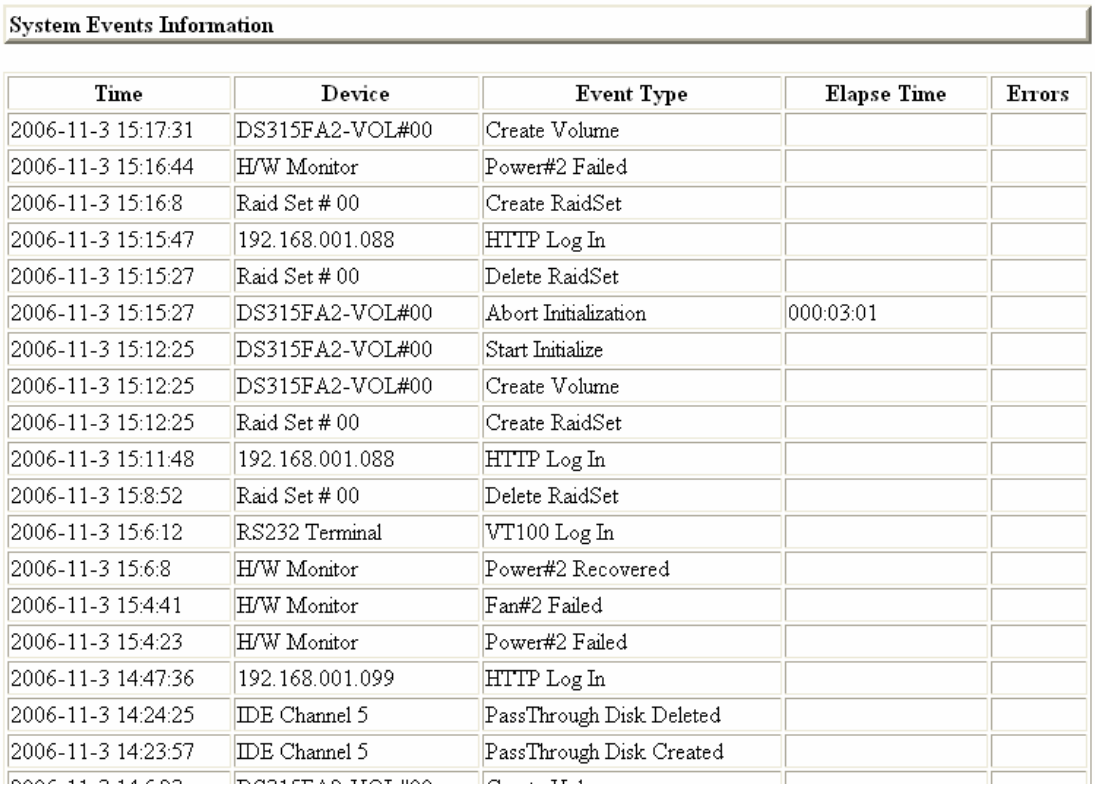
SNMP Configuration

This function allows you to configure SNMP configuration. Please configure all settings according to your wish. Please read the instructions carefully before you configure. When finished, check **Confirm The Operation** and the click on Submit to finish.



View Events/ Mute Beeper

To view the RAID subsystem controller's information, move the mouse cursor to the main menu and click on the **View Events/Mute Beeper** link. The Raid Subsystem events Information screen appears. Choose this option to view the system events information: Timer, Device, Event type, Elapse Time and Errors. The RAID system does not built the real time clock. The Time information is the relative time from the RAID subsystem power on.



System Events Information

Time	Device	Event Type	Elapse Time	Errors
2006-11-3 15:17:31	DS315FA2-VOL#00	Create Volume		
2006-11-3 15:16:44	H/W Monitor	Power#2 Failed		
2006-11-3 15:16:8	Raid Set # 00	Create RaidSet		
2006-11-3 15:15:47	192.168.001.088	HTTP Log In		
2006-11-3 15:15:27	Raid Set # 00	Delete RaidSet		
2006-11-3 15:15:27	DS315FA2-VOL#00	Abort Initialization	000:03:01	
2006-11-3 15:12:25	DS315FA2-VOL#00	Start Initialize		
2006-11-3 15:12:25	DS315FA2-VOL#00	Create Volume		
2006-11-3 15:12:25	Raid Set # 00	Create RaidSet		
2006-11-3 15:11:48	192.168.001.088	HTTP Log In		
2006-11-3 15:8:52	Raid Set # 00	Delete RaidSet		
2006-11-3 15:6:12	RS232 Terminal	VT100 Log In		
2006-11-3 15:6:8	H/W Monitor	Power#2 Recovered		
2006-11-3 15:4:41	H/W Monitor	Fan#2 Failed		
2006-11-3 15:4:23	H/W Monitor	Power#2 Failed		
2006-11-3 14:47:36	192.168.001.099	HTTP Log In		
2006-11-3 14:24:25	IDE Channel 5	PassThrough Disk Deleted		
2006-11-3 14:23:57	IDE Channel 5	PassThrough Disk Created		

Clear Events Buffer

Use this feature to clear the entire events buffer information.

Generate Test Event

Use this function to generate a test event. Check **Confirm The Operation** and then click on **Submit** to complete.

Clear Event Buffer

Use this function to clear the event buffer. Check **Confirm The Operation** and then click on **Submit** to complete.

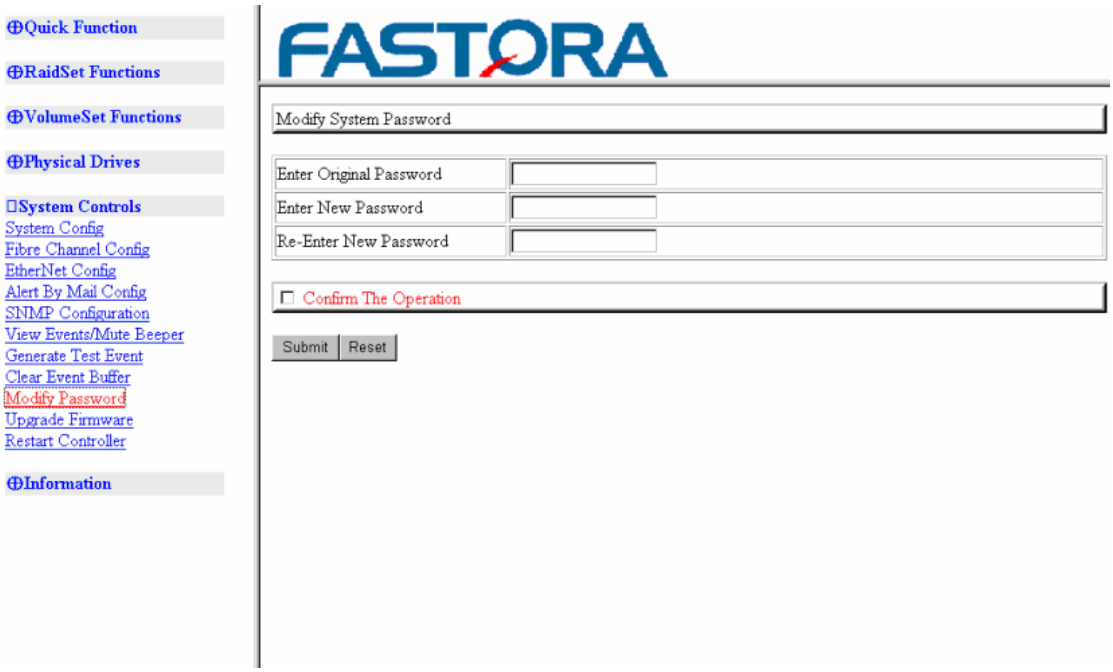
Modify Password

To set or change the RAID subsystem password, move the mouse cursor to **Raid System Function** screen, and click on the **Change Password** link. The Modify System Password screen appears.

The password option allows user to set or clear the raid subsystem's password protection feature. Once the password has been set, the user can only monitor and configure the raid subsystem by providing the correct password.

The password is used to protect the internal RAID subsystem from unauthorized entry. The controller will check the password only when entering the Main menu from the initial screen. The RAID subsystem will automatically go back to the initial screen when it does not receive any command in ten seconds.

To disable the password, press **Enter** key only in both the **Enter New Password** and **Re-Enter New Password** column. Once the user confirms the operation and clicks the **Submit** button, the existing password will be cleared. No password checking will occur when entering the main menu from the starting screen.



Upgrade Firmware:

Use this feature to upgrade firmware. Enter the firmware file name in the field, or click on browser to find the file in the specific location. When finished, check Confirm The Operation and then click on Submit. The firmware upgrade will begin. Or you may refer to the appendix B firmware utility for upgrading firmware via terminal.

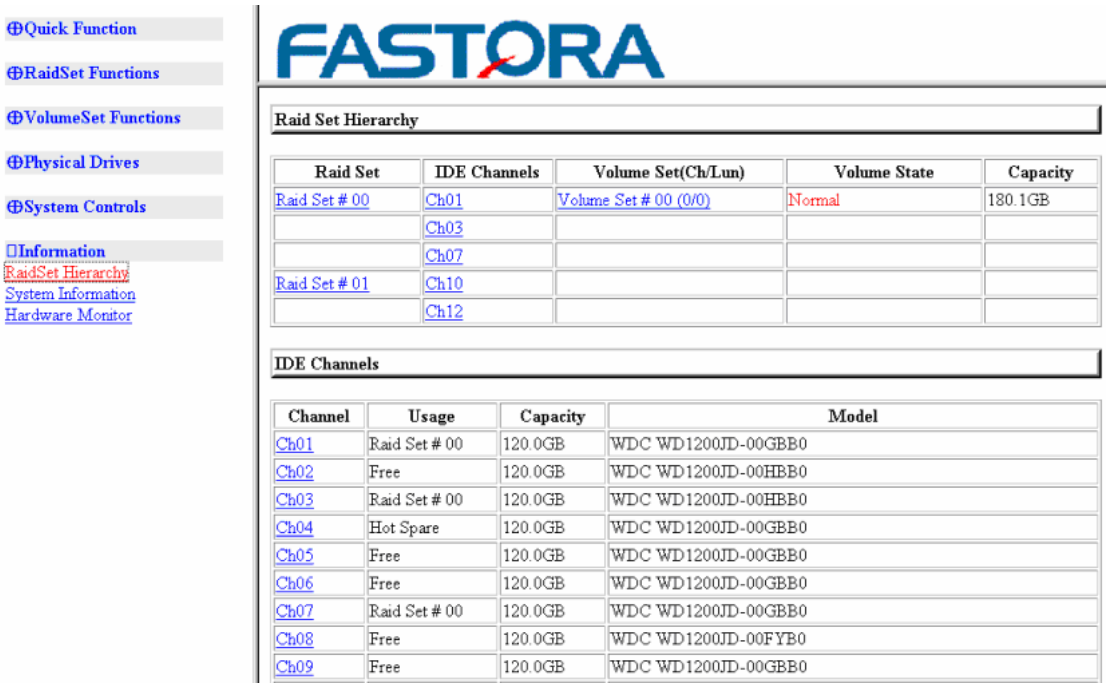
Restart Controller

Use this function to restart controller of DAS-315FA2. Check Confirm To Restart Controller, and then click on Submit to finish.

Information Menu

Raid Set Hierarchy

Use this feature to view the internal raid subsystem current raid set, current volume set and physical disk configuration. Please refer to **Configuring Raid Sets and Volume Sets.**



System Information

To view the RAID subsystem controller's information, move the mouse cursor to the main menu and click **System Information** link. The Raid Subsystem Information screen appears.

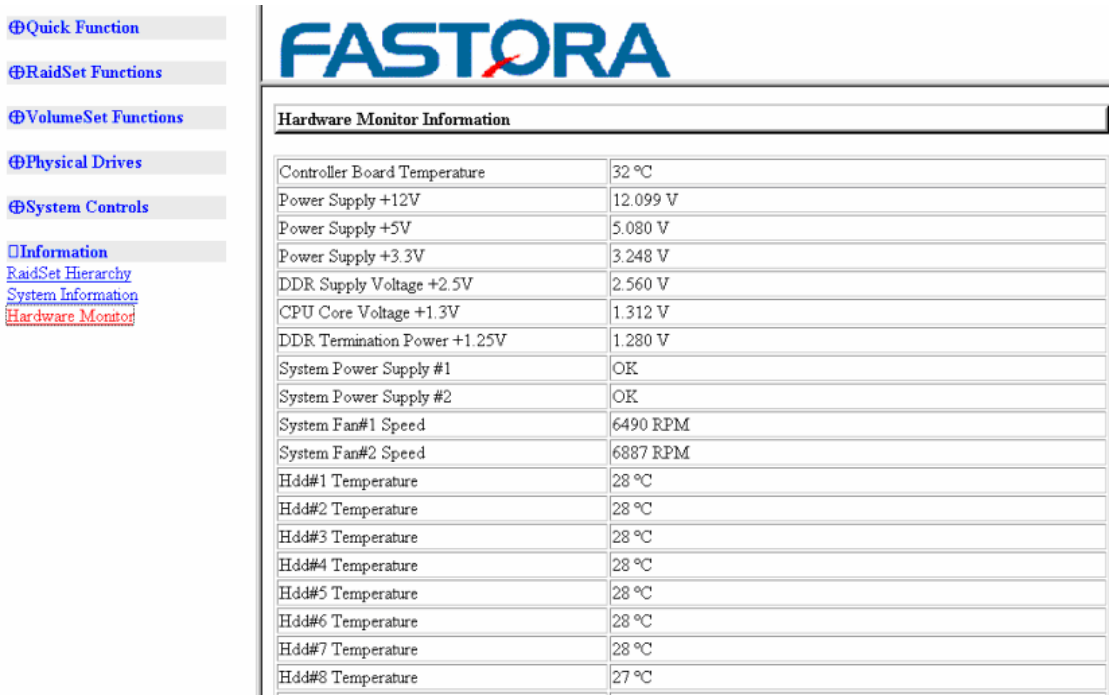
Raid Subsystem Information

Controller Name	DS315FA2
Firmware Version	V1.41 2006-6-7
BOOT ROM Version	V1.41 2006-6-7
Agilent TSDK	V4.0
Serial Number	A633TGAMAX500003
Unit Serial #	
Main Processor	400MHz IOP321
CPU ICache Size	32KBytes
CPU DCache Size	32KBytes/Write Back
System Memory	256MB/200MHz/ECC
Current IP Address	192.168.1.100

Use this feature to view the raid subsystem controller's information. The controller name, firmware version, serial number, main processor, CPU data/Instruction cache size and system memory size/speed appear in this screen.

Hardware Monitor

To view the RAID subsystem controller's hardware monitor information, move the mouse cursor to the main menu and click the Hardware Monitor link. The Hardware Information screen appears.



The Hardware Monitor Information provides the temperature, fan speed (chassis fan) and voltage of the internal RAID subsystem. All items are also unchangeable. The warning messages will indicate through the, LED and alarm buzzer.

Item	Warning Condition
Controller Board Temperature	**> 50 Celsius**
Backplane Temperature	**> 50 Celsius**
Controller Fan Speed	**< 1900 RPM**
Power Supply +12V	**< 10.5V or > 13.5V**
Power Supply +5V	**< 4.7V or > 5.3V**
Power Supply +3.3V	**< 3.0V or > 3.6V**
CPU Core Voltage +1.5V	**< 1.35V or > 1.65V**

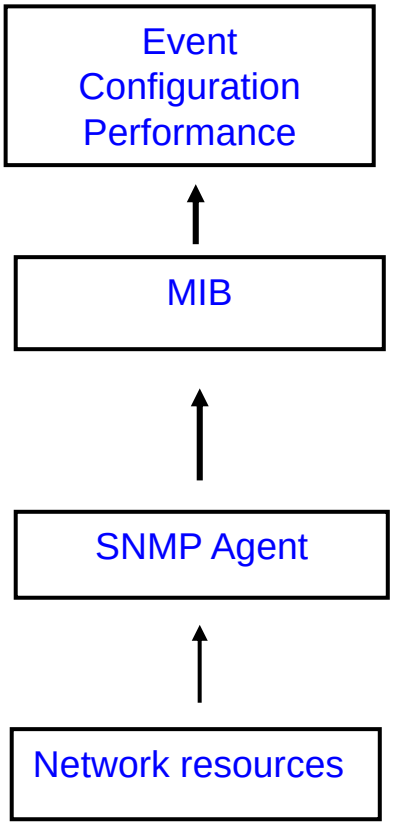
Chapter 6 SNMP operation & Definition

Overview

DAS-315FA2 Disk Array external RAID controller firmware-embedded Simple Network Management Protocol (SNMP) agent for the connect array. An SNMP-based management application (also known as an SNMP manager) can monitor the disk array. An example of An SNMP management application is Hewlett-Packard's Open View. The firmware-embedded SNMP agent ca be used to augment the RAID controller if you are already running an SNMP management application at your site.

SNMP Definition

SNMP, an IP-based protocol, has a set of commands for getting the status of target devices. The SNMP management platform is called the SNMP manager, and the managed devices have the SNMP agent loaded. Management data is organized in a hierarchical data structure called the management Information Base (MIB). These MIBs are defined and sanctioned by various industry associations. The objective is for all vendors to create products in compliance with these MIBs so that inter-vendor interoperability can be achieved. If a vendor wishes to include additional device information that is not specified in a standard MIB, then that is usually done through MIB extensions.



SNMP Installation

The installation of the SNMP manager is accomplished in several phases:

- Installing the Manager software on the client
- Placing a copy of the management information base (MIB) in a directory which is accessible to the management application
- Compiling the MIB description file with the management application

MIB Compilation and Definition File creation

Before the manager application accesses the RAID controller, user needs to integrate the MIB into the management application's database of events and status indicator codes. This process is known as compiling the MIB into the application. This process is highly vendor-specific and should be well-covered in the User's Guide of your SNMP application. Ensure the compilation process

successfully integrates the contents of the FASTORARAID.MIB file into the traps database.

Location for MIB

Depending upon the SNMP management application used, the MIB must be placed in a specific directory on the network management station running the management application. The MIB file must be manually copied to this directory. For example:

SNMAP Management Application	MIB Location
• HP OpenView	\OV\MIBS
Netware NMS	\NMS\SNMPMIBS\CURRENT

Your management application may have a different target directory. Consult the management application's user manual for the correct location.

DAS-315FA2 RAID MIB Object Definitions

All traps are defined under this object according to the following table :

Trap	Trap Number
[Reserved]	1-127
Traps 128-255 are RaidSet Traps	
rsCreate	128
rsDelete	129
rsExpand	130
rsRebuild	131
rsDegraded	132
rsNoEvent	133
[Reserved]	134-255
Traps 256-383 are VolumeSet Traps	
vsInitializing	256
vsRebuilding	257
vsMigrating	258
vsChecking	259
vsCompleteInit	260
vsCompleteRebuild	261
vsCompleteMigrating	262
vsCompleteChecking	263
vsCreate	264
vsDelete	265
vsModify	266
vsDegraded	267
vsFailed	268
vsRevived	269
vsTotals	270
[Reserved]	271-383
Traps 384-511 are IDE Device Traps	
pdAdded	384
pdRemoved	385
pdReadError	386
pdWriteError	387

pdAtaEccError	388
pdAtaChangeMode	389
pdTimeOut	390
pdMarkFailed	391
pdPciError	392
pdSmartFailed	393
pdCreatePass	394
pdModifyPass	395
pdDeletePass	396
pdTotals	397
[Reserved]	398-511

Traps 512-639 are SCSI Bus Traps

scsiReset	512
scsiParity	513
scsiModeChange	514
scsiTotals	515
[Reserved]	516-639

Traps 640—676 Hardware Monitor Traps

hwSdram1BitEcc	640
hwSdramMultiBitEcc	641
hwTempController	642
hwTempBackplane	643
hwVoltage15	644
hwVoltage3	645
hwVoltage5	646
hwVoltage12	647
hwVoltage1_3	648
hwVoltage2_5	649
hwVoltage1_25	650
hwPower1Failed	651
hwFan1Failed	652
hwPower2Failed	653
hwFan2Failed	654
hwPower3Failed	655
hwFan3Failed	656
hwPower4Failed	657
hwFan4Failed	658
hwUpsPowerLoss	659

hwTempController_R	660
hwTempBackplane_R	661
hwVoltage15_R	662
hwVoltage3_R	663
hwVoltage5_R	664
hwVoltage12_R	665
hwVoltage1_3_R	666
hwVoltage2_5_R	667
hwVoltage1_25_R	668
hwPower1Failed_R	669
hwFan1Failed_R	670
hwPower2Failed_R	671
hwFan2Failed_R	672
hwPower3Failed_R	673
hwFan3Failed_R	674
hwPower4Failed_R	675
hwFan4Failed_R	676

Appendix A : RAID Levels Tutorial

FASTORA DAS-315FA2 DAS Subsystem supports RAID levels 0, 1, 3, 5 and 0+1. This tutorial will give you a brief look of the RAID (Redundant Array of Inexpensive Disks) technology.

This appendix covers the following topics:

- A.1 RAID Fundamentals
- RAID 0
- RAID 1
- RAID 2
- RAID 3
- RAID 4
- RAID 5
- Summary Table

A.1 RAID Fundamentals

RAID (**R**edundant **A**rray of **I**ndependent **D**isks) is a series of storage technologies described in 1987 by three researchers from University of California at Berkeley: David Patterson, Garth Gibson and Randy Katz. RAIDs were conceived to overcome the data reliability problems associated with disk storage subsystems while increasing various performance aspects.

Here we put a description of how each type of RAID operates, plus its strengths and weaknesses. An unavoidable drawback to all large groups of disk drives, although disk MTBF figures range up to 250,000 hours or five years, is a large number of “maintenance incidents”. Because of redundancy schemes, these “incidents” in a RAID do not normally result in any loss of data or even access to the data. Stated another way, there will be failures of disks over the lifetime of a large RAID disk subsystem, but it is unlikely that there will

be data lost or made unavailable.

The RAID redundancy schemes are capable of regenerating the data from a failed disk drive. After a disk has failed, it can be replaced by a spare (called a “hot spare” if it is always resident and powered up in the subsystem) and the data can then be rebuilt on the replacement disk. The overhead associated with the rebuilding process may affect storage “throughput”, which is the data access rate that can be serviced by the storage subsystem. Depending on the application of the data processing system, storage throughput is measured by **transaction rate** or **transfer rate** (or both). Transaction rate is expressed in input/output, or I/O, operations per second (**IOPS** or **IO/s**). Transfer rate is expressed in millions of bytes transferred per second (**MBPS** or **MB/s**).

Two other shortcomings of RAID are shared with disk drives in general: **seek** and **latency**. Seek is the time it takes to move the read/write (R/W) heads to the location of the data, and latency is the time it takes for the specific data to spin around under the R/W head. Average latency for a disk is ½ a revolution. RAID can make latency worse if, as in RAID levels 2 and 3, multiple disks store the data and the disks are not rotationally synchronized. A disk feature called “spindle synchronization” can overcome this drawback, but not all disks offer the feature.

A.2 RAID 0

This is not a true RAID as defined by the Berkeley group, but rather a colloquial addition to describe the typical “disk farm” used by midrange and larger computers. A technique called “striping” or “spanning” increases the effective data transfer rate by dividing up the data file into smaller blocks and recording them on separate disks. Susceptibility to failure is increased because any particular disk stores a portion of many data files; if a disk is lost,

the files are also lost.

Logically, RAID 3 is RAID 0 with added fault tolerance.

A.3 RAID 1

This version of RAID has been around for years, known as “mirroring” or “duplexing”. The exact same data exists on pairs of disk drives, and can be read from either. This allows two simultaneous reads per mirrored pair, which can double the read transaction rate. Write operations, which must be done to both disks in the mirrored pair, offer no performance advantage, and may actually reduce write performance well below that of a single disk.

Because of its high data reliability and ease of implementation, RAID 1 has been used in storing critical data for years. Theoretically it is the most expensive fault tolerant technique, due to having twice the disks required to store the data, and does little to enhance performance.

A.4 RAID 2

Each disk in the array contributes one bit of the data transfer word; e.g., a 32-bit word requires 32 data disks. A solid-state memory Error Checking and Correction (ECC) scheme called Hamming Code provides fault tolerance. While Hamming Code requires several additional ECC disks (7 for 32 bits of data, 8 for 64 bits of data), it is capable of identifying and correcting single disk failures on the fly, so throughput is not affected by a disk failure.

Because all disks are involved in each data file access, the transfer rate is very high while the transaction rate is that of a single disk. If spindle synchronization is not used, average latency approaches a full disk revolution. RAID 2’s high transfer rate is targeted at **very** large data record sizes, which it can efficiently handle. It is seldom seen outside of the special application and supercomputer

environments.

A.5 RAID 3

RAID 3 (and RAIDs 4 and 5 also) is based on the **odd parity principle**, which is best explained through an example. If we assume that there are four synchronized data streams of bits ("**bi**nary digi**ts**", which can only be zero or one), a fifth "parity" stream would be generated, so that the total number of bits at any given instant is always odd. E.g., if the data bits at an instant in time are 0101, the parity generated would be 1 (total of three bits on); for 0001, p would be 0 (1 bit on); for 0110, p = 1; for 1000, p = 0; etc. The parity bit is stored with its corresponding data bits, so that it can be used for either **error detection** or **error correction**.

In **error detection**, if the total number of bits including parity is even, an error occurred (which bit position is not known without more information). In **error correction**, in which bit line is in error is known, parity may be generated for all lines except the one in error, recreating the failed bit stream. Disks are checked for read failure at the end of each physical block recorded on the surface of the disk (called a "sector") when the error checking code (ECC) that was recorded with the data is compared to the ECC generated on reading back the data.

In RAID 3, a variable number of data disks (usually four to eight) store blocked (grouped) data streams (like RAID 0) and a single parity disk records the generated parity for the data blocks. A data file that is to be recorded is broken up into blocks and recorded on the data disks, with its corresponding parity block(s) recorded on the data disks. Because all disks together transfer each data file, the number of data disks multiplies the data transfer rate, but the transaction rate is that of a single disk. Both read and write operations involve

all array disks.

If a disk fails, the data from the good disks can recreate the failed data via generating parity. Which disk failed is known from the fact that a disk is not responding or has reported an ECC error.

A.6 RAID 4

Rather than being broken up into blocks and stored on multiple data disks, as a RAID 3 data file is, RAID 4 stores the entire data file on a single disk. The corresponding location on the parity disk contains the parity for not just the first data file, but also for the other (unrelated) data files stored on the corresponding locations on the other data disks.

Data transfer rates are the same **per data file** as single disk transfer rates, but multiple (as many as there are data disks) files may be simultaneously read. This generates a high read transaction rate and good aggregate read transfer rates. However, RAID 4 is seldom implemented because of the problems that ensue in the event of a read error or any write operation.

A RAID 4 write operation requires two disk revolutions for the following sequence:

- both the old data file (to be overwritten) and its corresponding parity file must be read;
- a new parity file is generated from the old data file, the parity file, and the new data file;
- the new data file and the new parity file are written.

A read error requires that all disks be used to recreate the failed data file, eliminating the multiple concurrent transfer potential.

A.7 RAID 5

To improve the poor write and read error performance of RAID 4, RAID 5 makes one simple (in concept) change which has major performance ramifications: distributed parity files. Instead of having all parity files located on a single disk, the parity files are allocated evenly to all disks, always with the corresponding data files on other disks.

This change allows multiple writes to take place as long as they don't "collide" at a particular disk; e.g., in an eight disk RAID 5 environment, as many as four concurrent writes could occur. Each write still involves two disk revolutions.

Read transaction performance is excellent, with as many concurrent reads possible as there are disks. The aggregate read transfer rate is also excellent, but each individual read is transferred at a single disk's rate.

A. 8 Summary Table

Given: Net storage capacity = 8GB**:** RAID 1 = 2 ea. 8GB disks; RAID 2 = 11 ea. 1GB disks; RAID 3, 4 and 5 = 5 ea. 2GB disks. Disk seek and latency equal. Spindle synchronized where needed. Numbers in parenthesis indicate how many possible concurrent operations of that type are possible, if more than 1.

RAID type	**Read transaction rate***	**Write transaction rate***	**Transfer rate per read***	**Transfer rate per write***	**Parity/ ECC Disk overhead**	**Transaction rate on failure***	**Transfer rate on failure***
1	2X	=	= (2)	=	100%	=	=
2	=	=	8X	8X	27%	=	8X
3	=	=	4X	4X	20%	=	‡
4	4X	=	= (4)	=	20%	= (<2)	<=
5	5X	≈ 2X+	= (5)	= (2+)	20%	≈ 3X+	‡

* Compared to a single 8GB disk.

‡ Varies with RAID manufacturer

Appendix B: Technical Specifications

Model	**DAS-315FA2**
Processor	Intel 80321
RAM	256MB ECC (up to 1GB)
Disk Interface	Serial ATA
Disk Channels	15 operating parallel channels
Disk Type	Serial ATA/150MBps
Host Interface	Fibre Channel
Host Channels	2 channels
Drive Bays	15 bays
Environment Monitor	Power, fan, disk, and temperature failure
Power	400 Watts redundant power supplies with load sharing
RAID Level	0, 1, 10, 3, 5, 6
Multiple RAID Sets	Yes
Online Capacity Expansion	Yes
Rebuild Hot Spare Drives	Automatically and transparently
Drive Hot Swap	Yes
Drive Insertion or removal	Automatic detection and rebuilding
Firmware Upgrade	Via RS-232 port
Management Tool	Web browser RAID management or RS-232 port
Dimensions	31.4 x 39.0 x 17.0 (cm) (LxHxW)
Weight	14kg (w/o HDD)
Deployment	Tower/Rack(optional)
Operating Temperature	+5C to +40C
Operating Humidity	20% to 80%, non-condensing
Storage Temperature	-40C to +70C
Storage Temperature	5% to 90%, non-condensing
Input Voltage	100-240V AC

Appendix C: Upgrading Flash Firmware Programming Utility

Since the RAID controller features flash firmware, it is not necessary to change the hardware flash chip in order to upgrade the RAID firmware. The user can simply re-program the old firmware through the RS-232 port or 10/100 Ethernet port. New releases of the firmware are available in the form of a DOS file at OEM's FTP. The file available at the FTP site is usually a self-extracting file that contains the following:

XXXXVVV.BIN Firmware Binary (where "XXXX" refers to the model name and "VVV" refers to the firmware version)

README.TXT It contains the history information of the firmware change. Read this file first before upgrading the firmware.

These files must be extracted from the compressed file and copied to one directory in drive A: or C:.

Establishing the Connection for the RS-232 and Ethernet port

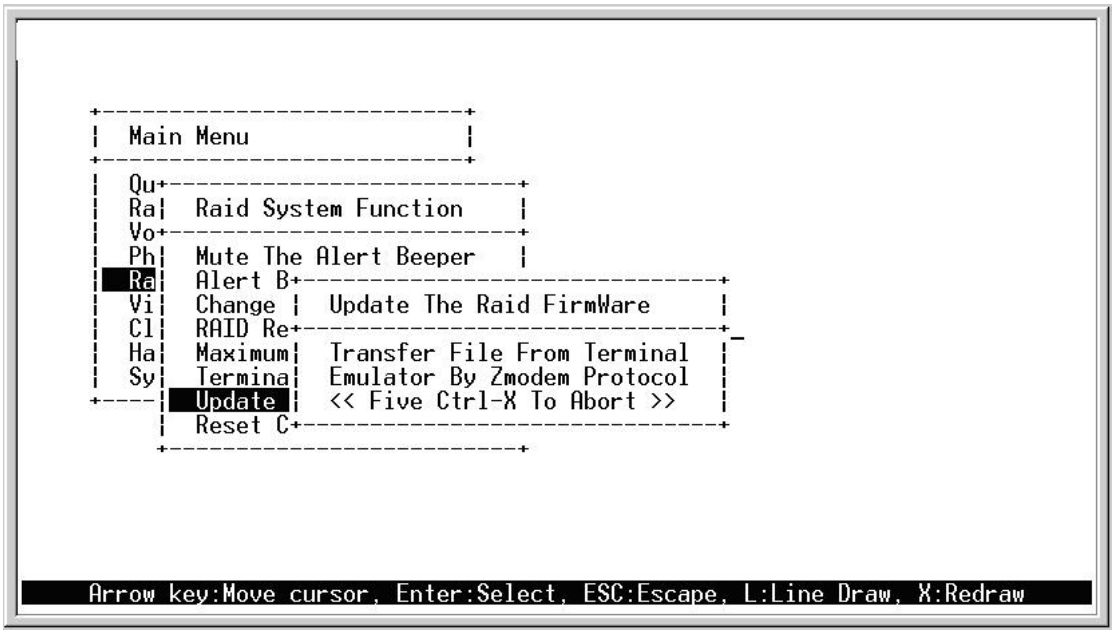
The firmware can be downloaded to the RAID controller by using an ANSI/VT-100 compatible terminal emulation program or HTTP web browser manager. You must complete the appropriate installation procedure before proceeding with this firmware upgrade. Please refer to chapter 4.3, "VT100 terminal (Using the controller's serial port)" for details on establishing the connection. Whichever terminal emulation program is used must support the ZMODEM file transfer protocol.

Web browser-based RAID manager can be used to upgrade the firmware. You must complete the appropriate installation procedure before proceeding with this firmware upgrade. Please refer to chapter 6.1, "Web browser-based RAID manager (Using the controller's Ethernet port)" for details on establishing the connection.

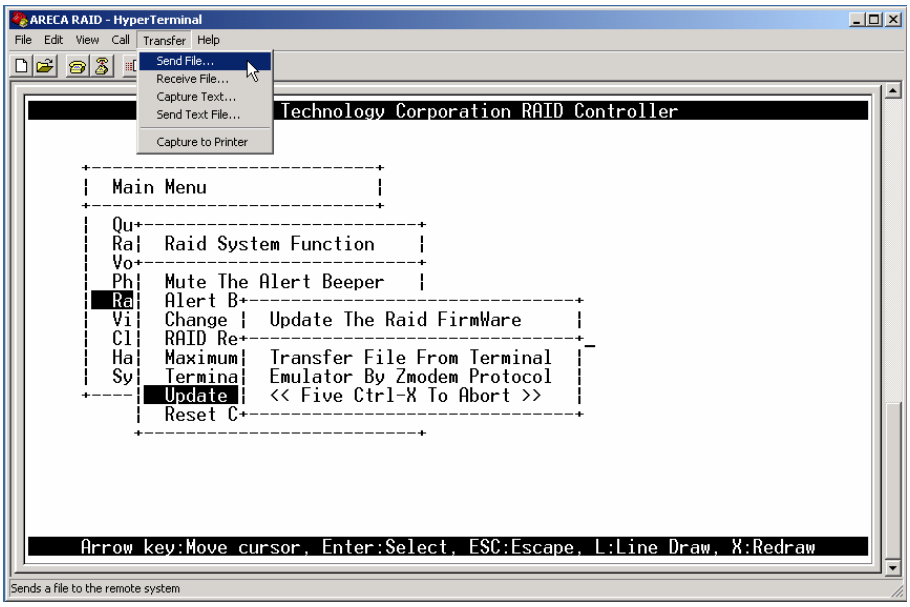
Upgrading Firmware Through ANSI/VT-100 Terminal Emulation

Get the new version firmware for your RAID controller. For Example, download the bin file from your OEM's web site onto the c:

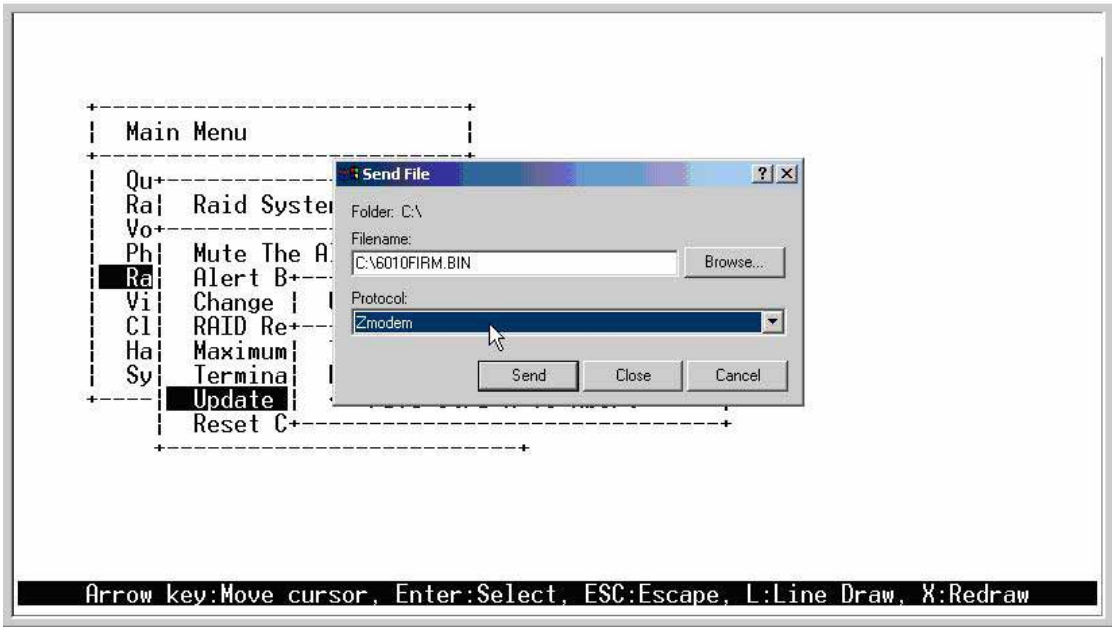
1. From the Main Menu, scroll down to "**Raid System Function**"
2. Choose **Update Firmware**, Update the Raid Firmware dialog box will appear.



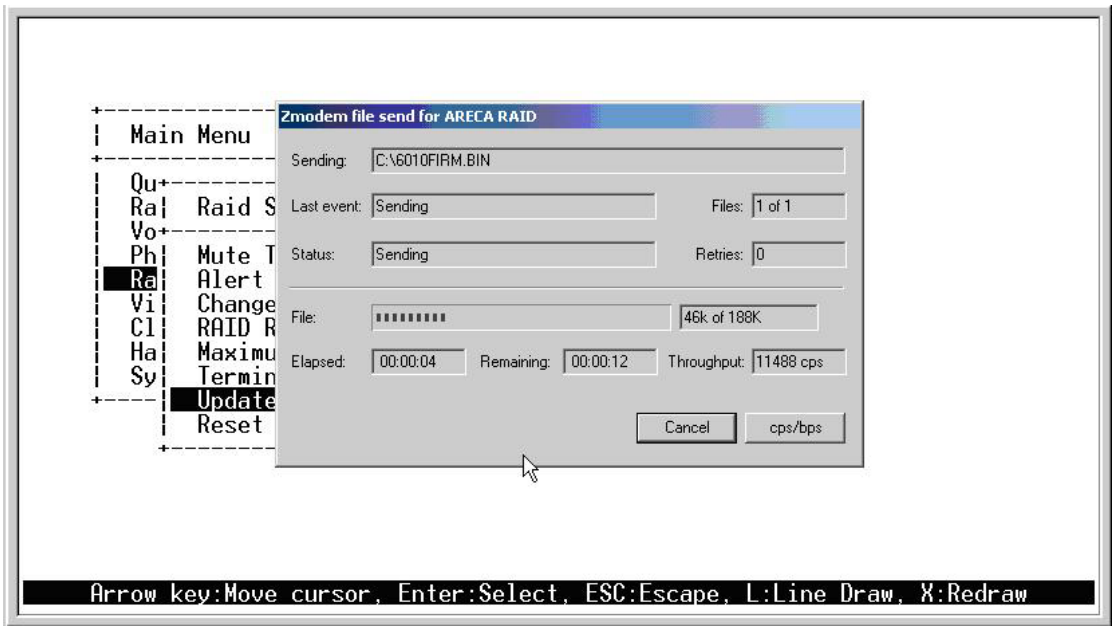
3. Go to the tool bar and select Transfer. Open "**Send File**".


ARECA RAID - HyperTerminal
File Edit View Call Transfer Help
Send File...
Receive File...
Capture Text...
Send Text File...
Capture to Printer
Technology Corporation RAID Controller
Main Menu
Raid System Function
Mute The Alert Beeper
Change | Update The Raid FirmWare
Maximum | Transfer File From Terminal
Termina | Emulator By Zmodem Protocol
Update | << Five Ctrl-X To Abort >>
Reset C
Arrow key:Move cursor, Enter:Select, ESC:Escape, L:Line Draw, X:Redraw
Sends a file to the remote system

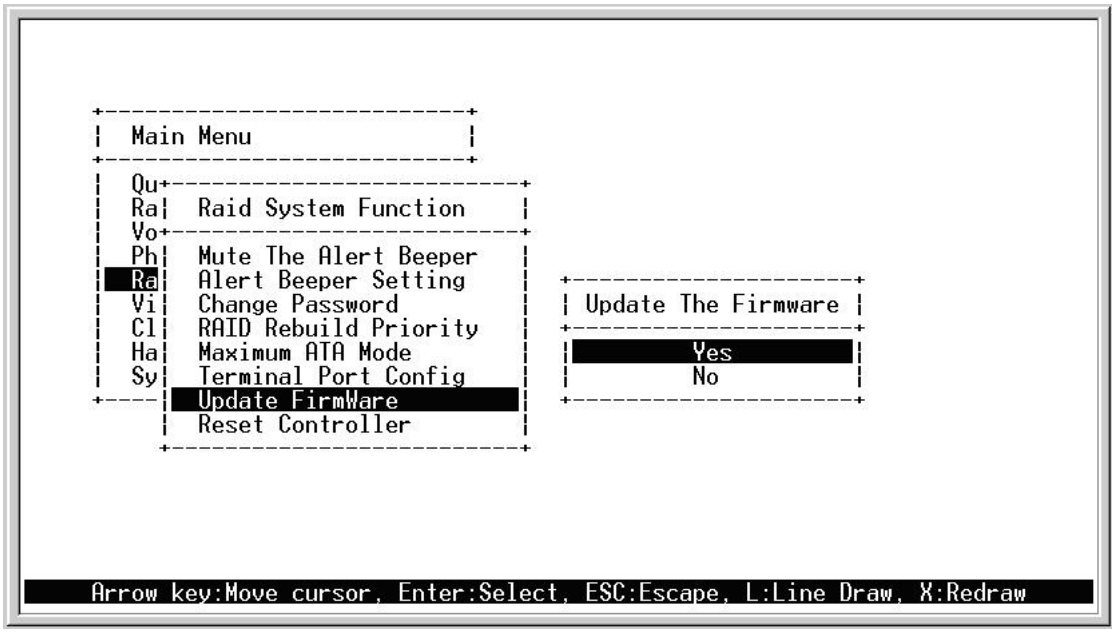
4. Select "**ZMODEM modem**" under Protocol. ZMODEM as the file transfer protocol of your terminal emulation software.
5. Click Browse. Look in the location where the Firmware upgrade software is located. Select the File name and click "**open"**.



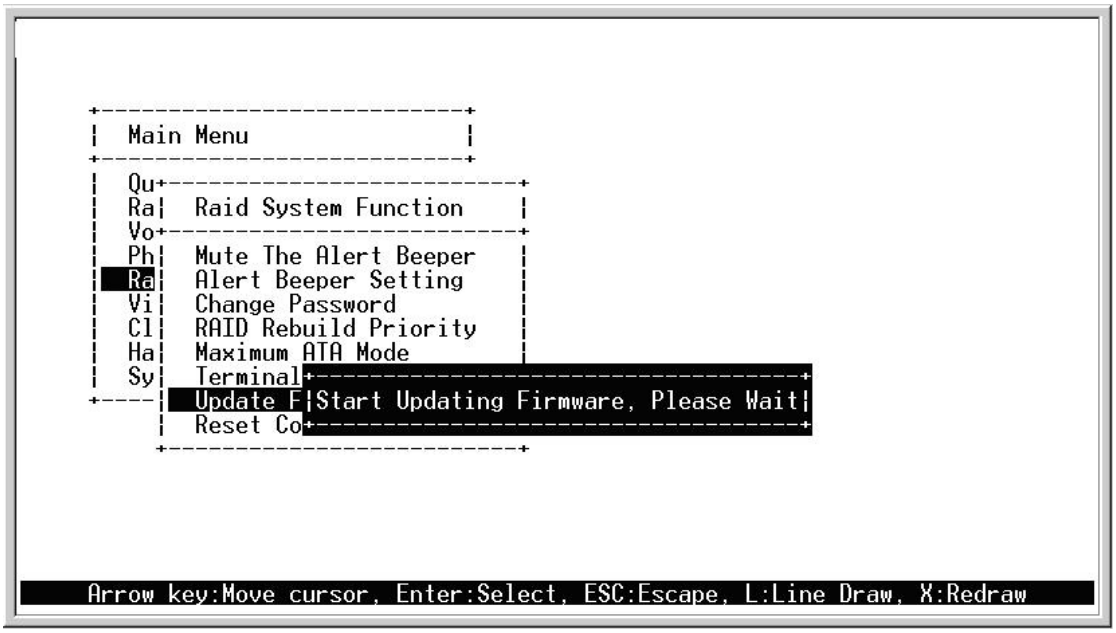
6. Click "**Send**". Send the Firmware Binary to the controller



7. When the Firmware completes downloading, the confirmation screen appears. Press "**Yes"** to start program the flash ROM.

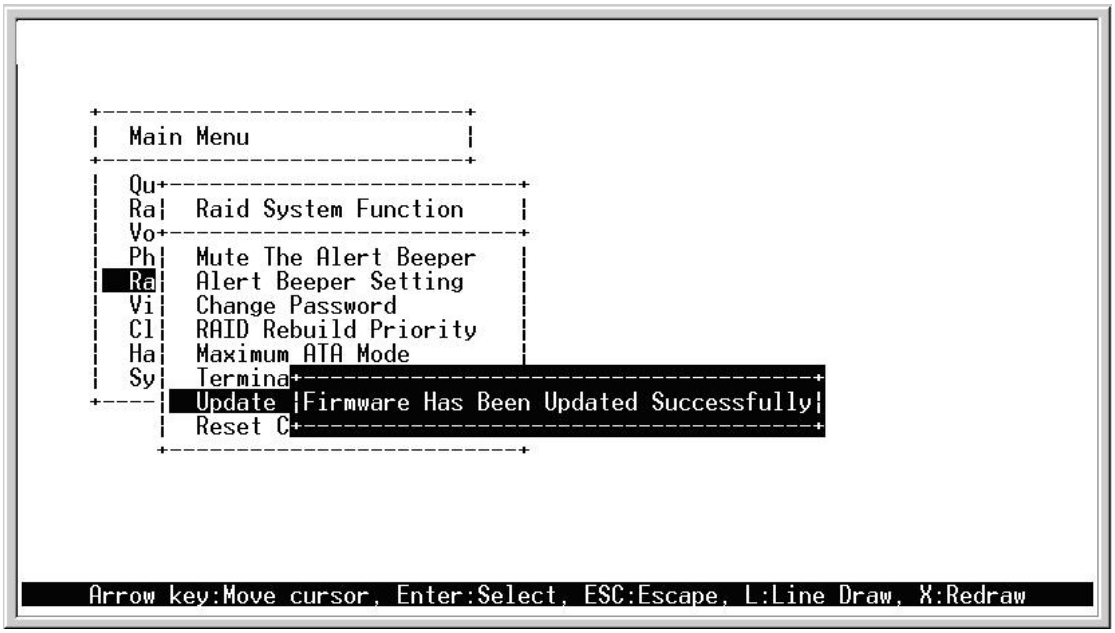


8. When the Flash programming starts, a bar indicator will show **Start Updating Firmware. Please Wait**.



9. The Firmware upgrade will take approximately thirty seconds to complete.

10. After the Firmware upgrade is complete, a bar indicator will show **Firmware Has Been Updated Successfully**.



10. After the new firmware completes download, user should find a chance to

restart the controller for the new firmware to take effect.

NOTE: The user has to reconfigure all of the settings after the firmware upgrade is complete, because all of the settings will default to the original default values.

Upgrading Firmware Through HTTP Proxy Web Browser Management

Get the new version firmware for your RAID subsystem controller. For Example, download the bin file from your OEM's web site onto the c:

1. To upgrade the RAID subsystem firmware, move the mouse cursor to **"Upgrade Firmware"** link. The "**Upgrade The Raid System Firmware"** screen appears.
2. Click Browse. Look in the location where the Firmware upgrade software is located. Select the File name, then click "**open"**.
3. Check **"Confirm The Operation"** and press the **"Submit"** button.
4. The Web Browser begins to download the firmware binary to the controller and start to upgrade the flash ROM.

After the firmware upgrade is complete, a bar indicator will show **Firmware Has Been Updated Successfully**.

5. After the new firmware completes download, user should find a chance to restart the controller for the new firmware to take effect.

NOTE: The user has to reconfigure all of the settings after the firmware upgrade is complete, as all settings will go back to the original default values.